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ABSTRACT

An evaluation of this Syracuse, New York workplace literacy skills improvement project had three purposes: to characterize changes in the baseline performance of adults' workplace literacy skills as a function of instructional treatment; to characterize changes in workers' and supervisors' perceptions of worker effectiveness as a function of instructional treatment; and to monitor the project for compliance with grant specifications. Participants included a total of 67 workers from a variety of Syracuse-area manufacturing companies. They were evaluated using the Educational Testing Service's Tests of Applied Literacy Skills, which measure three domains: document, quantitative, and prose literacy. The evaluations showed that attendance at classes ranged from 73 to 100 percent for the 9 classes that were offered. In addition, almost all teacher-made pre/posttests showed gains. The project suffered from plant layoffs and shutdowns, decreasing the numbers of employees who participated and making evaluation more difficult. However, workers and their supervisors were pleased with the classes and workers also expressed increased self-confidence. The report includes scoring rules for the evaluation tests. Also appended are sample forms used in the project, an explanation of developing contextualized curricula, and curriculum outlines for the following courses: math for maintenance, technical documentation, metric conversion for blueprint reading, math for statistical process control, procedural documentation, math for charting, math for machine operators, and metric immersion for skilled trades. (Contains 11 references.) (KC)

ED355408

SYRACUSE LABOR/MANAGEMENT CONSORTIUM

Workplace Literacy Skills Improvement Project

Evaluation Report

March 30, 1993

U.S. DEPARTMENT OF EDUCATION
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Evaluation Report of the Syracuse Union-Management Consortium National Workplace Literacy Grant

This evaluation of the OCMBOCES/BiTS Workplace Literacy Skills Improvement Project served three purposes: (1) To characterize changes in the baseline performance of adults workplace literacy skills as a function of instructional treatment; (2) to characterize changes in workers' and supervisors' perceptions of worker effectiveness also as a function of instructional treatment; and (3) to monitor the project for compliance with grant specifications. In this evaluation, each of three purposes are addressed in turn. In Part I, we first discuss the measures used to profile workers' literacy abilities before and after program treatment. In this section, the profiles of workers' literacy abilities are identified; the relative impact of the instructional program is discussed. In Part II, we describe the perceptions of workers and their supervisors as they relate to job satisfaction and effectiveness. In Part III, we consider the extent to which the OCMBOCES/BITS Literacy Skills Improvement Project was able to comply with grant guidelines. Finally, in Part IV, we summarize the major findings and recommendations of the evaluation.

In putting forth the first two purposes of this paper, we are mindful that evaluations of workplace literacy programs often include reference to context-specific data, including workers' self-reports, published job descriptions, and observations. However, the use of site-specific evaluation limits a project's ability to claim that it is effective relative to known standards. Conversely, when standardized instruments are used, the view of literacy which is represented by the test is often too general, not accounting for those things that may contribute to particular workers' expertise and on-the job effectiveness. As such, neither type of evaluation is adequate by itself. To represent both dimensions of program effectiveness, we undertook both quantitative and

qualitative analyses in order to better understand the effects of the Workplace Literacy Skills Improvement Project.

To develop comprehensive job profiles, baseline literacy and demographic data were collected from all participating workers. The Educational Testing Service's (1990) *Tests of Applied Literacy Skills (TALS)* were used to assess participants before and after training. The Educational Testing Service's *Workplace Literacy Background Questionnaire* was also used to gather background information. These data were used with job audit data to design a detailed characterization, or job profile, of each job. A follow-up survey was used to gauge skill change upon completion of participation in the classes provided through this project. Post-class client satisfaction and program compliance were also considered to develop understanding of the constraints of the larger instructional and manufacturing context.

PART I

Profiling Workers' Literacy Skills

Participants

Participants included workers from a variety of Syracuse-area manufacturing companies. These companies included New Process Gear, General Motors, Die Molding, Oberdorder, Syracuse China, and Crucible Specialty Metals. Each of these companies was represented on the Workplace Literacy Skills Improvement Project by a Labor-Management Team. The number of workers who participated in each class within these companies is summarized in Table 1.

Insert Table 1 about here

Materials

The *ETS Tests of Applied Literacy Skills* (Educational Testing Service, 1990) were chosen in this evaluation to measure treatment effects. The purposes for selecting

Name of Class	Number of Students Enrolled	Number of Classes	Hours per Class	Percent Attendance	IDPs Completed	Average Pre-Post Increase (teacher-made tests)
Math for Maintenance	7	9	2	90%	2	20%
Math for Maintenance	11	10	2	87%	0	15%
Technical Documentation	6	8	2	73%	2	**
Technical Documentation	10	8	2	73%	0	**
*Math for SPC**	4	3	2	100%	4	
*Math for SPC**	6	7	2	83%	6	
*Metric Immersion**	10	6	2	92%	0	76%
Metric Conversion for Blueprint Reading	18	12	11/2	87%	18	70%
*Math for Charting**	13	6	1	85%	0	

Total Students = 67

* Class not completed at time of data analysis.
** No teacher-made pre-post, some workers very low skilled.

Table 1: Program Service Statistics

these tests were as follows: (1) They represent the broad range of reading materials which people commonly encounter in occupational, social, and educational settings; (2) these tests have construct validity such that the variables which influence task difficulty have been validated, and performance can be interpreted in light of these construct variables; and (3) these tests are extremely sensitive such that performance on these tests can be analyzed at a variety of levels, thus allowing for flexible interpretation of treatment effects by construct variable, task type, performance levels, and group aggregate score.

Rather than representing a single dimension of literacy, the ETS tests represent three domains: *document*, *quantitative*, and *prose* literacy. The document scale consists of material organized in matrix format and includes tables, graphs, pie charts, schedules, maps, and forms. The quantitative scale consists of numbers arrayed in document format. Finally, the prose scale consists of materials organized in paragraph format and includes exposition, narratives, notices, and announcements. For each scale, there are two parallel forms (Form A and Form B). Comprising the document scale are 26 Form A items and 26 Form B items. Document tasks are those that required respondents to locate, interpret and, in some cases, enter information found in documents. Comprising the quantitative scale are 23 Form A items and 23 Form B items. Quantitative tasks not only require respondents to locate, interpret and, in some cases, enter information found in a wide variety of documents; they also required respondents to perform calculations to arrive at a mathematical answer. Finally, comprising the prose scale are 24 Form A items and 24 Form B items. Prose tasks are those that require respondents to locate , interpret and integrate information found in paragraph formats.

Procedures

Task administration. Because of difficulties in securing time to administer the ETS Tests at work sites, very few pre-and posttests were collected, before and after

instructional treatment. Overall, 22 document pretests (Form A) and 22 document posttests were administered with eight respondents actually taking both. Similarly, 27 quantitative pretests (Form A) and 23 quantitative posttests (Form B) were administered with eight respondents taking both. And lastly, 26 prose pretests (Form A) and 32 prose posttests (Form B) were administered with only five respondents actually taking both the pre-and posttest.

Scoring. Two scores were determined for each respondent: the total number incorrect and the total percentage of tasks incorrect by "construct characteristic." *Construct characteristic* refers to the nature of the variables which influences the relative difficulty of each task. These variables are described and illustrated in each of the sections below which summarize respondents' performance on the document, quantitative, and prose scales, respectively.

Document Analysis

A Model of Document Processing

To understand the variables which influence respondents performance on the ETS Tests, Mosenthal and Kirsch (1991) have proposed the model identified in Figure 1. In this evaluation, we illustrate this model using the Abrasive Selection Guide shown in Figure 2.

Insert Figure 1 about here

Insert Figure 2 about here

The stages in the document processing model are as follows. **Stage 1: Identify a goal.** In the first stage, users identify a goal or purpose for processing a document. In the document scale of the ETS Test of Applied Literacy Skills, questions and directives

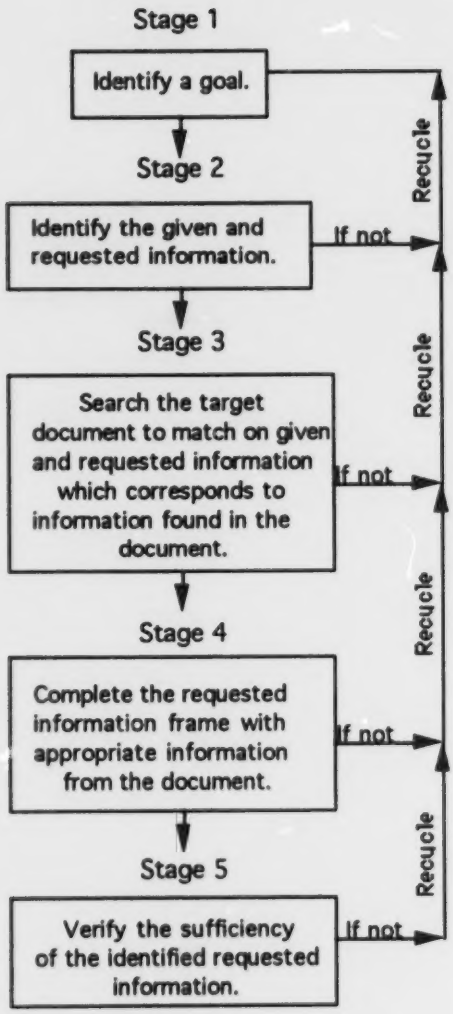
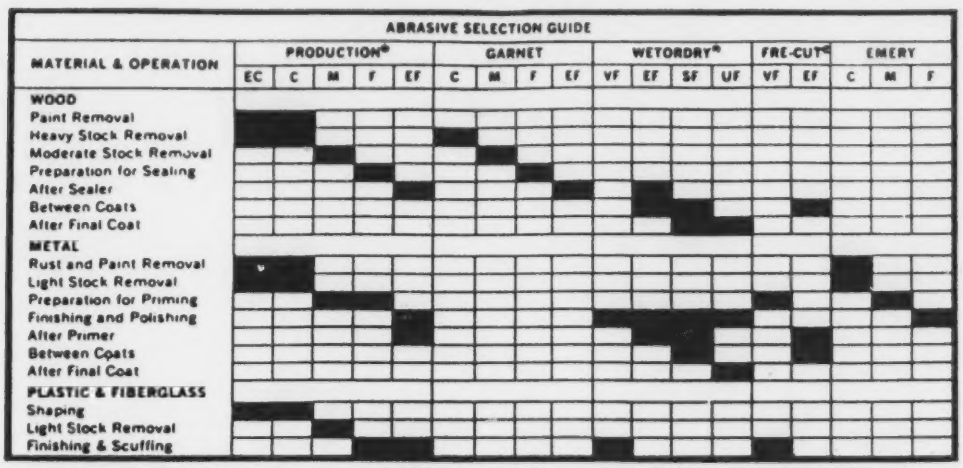


Figure 1. Model of document processing.

Figure 2

The Abrasive Selection Guide



EC = Extra Coarse C = Coarse M = Medium F = Fine VF = Very Fine EF = Extra Fine SF = Super Fine UF = Ultra Fine

SAFETY INFORMATION:

■ Wear approved safety goggles when sanding.

■ Use particle/dust mask or other means to prevent inhalation of sanding dust.

■ When using power tools, follow manufacturer's recommended procedures and safety instructions

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determine the primary purpose for interacting with the document and, thus what information document users must process in order to terminate a cognitive activity.

For instance, a question which users of the abrasive selection guide in Figure 2 might consider is the following:

(1) You need to smooth wood in preparation for sealing and plan to buy garnet sandpaper. What type of sandpaper should you buy?

In this instance, the users' goal would be to buy sandpaper in order to smooth wood in preparation for sealing.

Stage 2: Identify the given and requested information. Having represented a goal as a question or directive, document users proceed to Stage 2. In this stage, readers must distinguish between the "given" and "requested" information. In the ETS Test, *given information* is the information in a question or directive which is presumed to be true and which conditions the requested information. (In question (1) above, the given information would be: "You need to smooth wood in preparation for sealing and plan to buy garnet sandpaper.") In a general document literacy task, given information is what document users already know before they use a document. Similarly, in an assessment, *requested information* consists of the answer that is being sought, as well as the question or directive word(s) which designate that a particular answer is to be identified . (For instance, given Question 1 above, the requested information would include the question frame "What type of sandpaper should you buy?" as well as the answer, "Fine.") In a general document literacy task, requested information is the information that users seek in order to take some action.

Stage 3: Search the document to match requested and given information to corresponding document information. In this stage, users search the document to identify information which corresponds with information provided in the question or directive. In carrying out this search, several matches may be tried before one or more adequate matches are achieved. If a literal or synonymous

match is made between requested or given information and corresponding document information, users may then proceed to Stage 4. If such a match is not deemed adequate, users may choose to make a match based on a low or high text-based inference or prior knowledge; or users may recycle to an earlier stage or step.

For instance, in answering (1) above, users may begin by attempting to identify "types of sandpaper." Given that no specific label is provided, readers would have to infer that the types of sandpaper include: 'Extra Coarse,' 'Coarse,' 'Medium,' 'Fine,' 'Very Fine,' 'Extra Fine,' 'Super Fine,' and 'Ultra Fine.' In addition, users may or may not match on 'wood' in (1) with 'Wood' in Figure 2 to further make a match between 'preparation for sealing' in the question with the corresponding phrase in the list labeled 'Wood.' Finally, users would have to make a match between 'garnet' in (1) and 'Garnet' in Figure 2. Having completed these matches, users would then turn to Stage 4.

Stage 4: Fill in the requested information based on the information clues provided in the document. In this stage, users identify the missing requested information. In the case of answering Question 1, this might result in users first identifying 'F' and then cycling back to the list of sandpaper types to determine that 'F' stands for 'Fine.' In those instances where users are unable to complete the requested information, they may cycle to an earlier stage in the model to repeat one or more steps within that stage.

Stage 5: Verify the sufficiency of the requested new information. To ensure that the correct requested information has been supplied, users may recycle to earlier stages to ensure that all the conditions specified in a question or directive have been adequately addressed. In the case of Question 1, users may recycle to verify the type of material (i.e., 'wood' vs. 'metal' or 'plastic and fiberglass'), the type of operation (i.e., 'preparation for sealing' vs. 'paint removal,' etc.), and the match between 'garnet' in the question with the label 'garnet' in the document.

Document Variables

Structure variables. Based on Kirsch and Mosenthal's (1989) study of variables influencing the difficulty of document tasks found on the NAEP Young Adult Literacy Assessment (Kirsch & Jungeblut, 1986), five variables were hypothesized in the current study to influence the difficulty of ETS document tasks. Two of these variables represented the structural complexity of the documents themselves; these variables included the *number of items* and the *number labels*. To determine these, documents were divided into "simple lists" (Mosenthal & Kirsch, 1989). These lists consist of a series of exemplars, or items, which belong to a common class of elements (e.g., kinds of materials, types of operations, various conditions). In many instances, these items are organized in terms of a more generic category called a "label." For instance, the list of materials in the document in Figure 2 is the label for the items 'Wood,' 'Metal,' and 'Plastic and Fiberglass.' In some instances, labels are not provided for lists of items; in such cases, labels must be inferred. As noted earlier, this is the case for the list of sandpaper types (e.g., 'extra coarse,' 'coarse,' etc.) in Figure 2. This is also the case for the intersected list in Figure 2 which denotes whether a type of sandpaper is applicable or not relative to the choice of material, operation, and sandpaper selection.

Once the simple lists was identified for each document on the ETS Test (Forms A and B of the document scale), the number of items in each list were then totaled and recorded, as was the number of explicit labels. To define operationally the length of lists in a document, the number of items was divided by the number of explicit labels. To illustrate this, consider the abrasive selection guide in Figure 2. This document is partly organized as an "intersected list" (Mosenthal & Kirsch, 1989) consisting of three lists which might be labeled 'Material,' 'Sandpaper Selection,' and 'Applicability' (denoted by the presence or absence of darkened cells). While the items within the lists of 'Material' and 'Sandpaper Selection' get counted as items, they also get counted as labels, as they serve as "microlabels" for each row of information. In addition, the abrasive selection guide is a "nested list" (Kirsch & Mosenthal, 1990) in

which abbreviations of sandpaper types (e.g., 'EC,' 'C,' 'M,' 'F,' and 'EF') are nested by sandpaper selection (e.g, 'Production,' 'Garnet,' and 'Wetordry'), and types of operation (e.g., 'Paint Removal,' 'After Primer,' and 'Shaping') are nested by material (i.e., 'Wood,' 'Metal,' and 'Plastic & Fiberglass'). Again, while the abbreviations for the types of sandpaper and the various operations are scored as items, they are also scored as labels for the intersected list. An additional simple list includes the list of statements under the label 'Safety Information.' And finally, we find a combined list (Kirsch & Mosenthal, 1989) consisting of a list of abbreviations for the type of sandpaper and a corresponding list of what the abbreviations mean.

Based on these analyses, the abrasive selection guide was identified as having 353 items and 46 labels. Overall, the stimuli comprising the document scale ranged from 3 to 557 items and from one to 180 labels.

Process variables. The second set of variables which have been shown to influence document task difficulty include three process variables (Kirsch & Mosenthal, 1989): (1) type of information requested, (2) type of match, and (3) plausibility of distractor. *Type of information requested* refers to the type of information which users must identify in order to complete a question or directive. As Mosenthal and Kirsch (1991) have noted, documents typically consist of a rather restricted range of information types. These information types form a continuum of concreteness which was operationalized as follows: Questions requesting information regarding the identification of *persons, animals,* or *things* (e.g., "What would require the use of extra course production sandpaper to remove paint?" (answers 'wood' and 'metal')) were scored the highest (i.e., 1) in terms of concreteness . Questions requesting information regarding the identification of *amounts, times, attributes, types, times, actions,* and *locations* (e.g., "Medium production sandpaper is recommended for what type of stock removal?" (answer, 'moderate stock removal')) were assigned a concreteness score of 2.

Questions requesting information regarding the identification of *manner, goal, purpose, attempt, condition, pronomial reference,* and *predicate adjectives* (e.g., "According to the safety information in the abrasive selection guide, when should one follow the manufacturer's recommended procedures?" (answer, 'when using power tools')) were assigned a concreteness score of 3. Questions requesting information regarding the identification of *cause, effect, reason, result, evidence, similarity,* and *explanation* (e.g., "According to the safety information in the abrasive selection guide, what are two similarities between wood and metal in the use of production sandpaper?" (answer, 'Both require the use of extra coarse and coarse types of sandpaper to remove paint and stock')) were assigned a concreteness score of 4. And finally, questions requesting information regarding the identification of *equivalent , difference,* or some *combination of (1) - (4)* (e.g., an action plus a condition) were assigned a concreteness score of 5 (equivalence, in this case, tended to be a highly unfamiliar term for which respondents were to provide a definition, e.g, "What type of material is 'heavy stock' as listed in the abrasive selection guide?") (See Appendix A for a summary of the scoring rules for this variable.)

The variable, *type of match,* refers to the processes required to relate information in the question or directive to corresponding information in the document and to the process of entering a response. Type of match is influenced by the following. On average, "locate" matches are easier than "cycle" matches, and "cycle matches" are easier than "integrate" matches. In *locate tasks,* users match one or more features in a question or directive to one or more features in the document (Kirsch & Mosenthal, 1992). Based on this match, the answer is located in the "node" (i.e., either a matrix cell within a list, a matrix cell defined by the intersection of two or more lists, or a list itself) associated with these document features. An example of locate question applied to Figure 1 would be, "According to the abrasive selection guide, what three sanding operations apply to plastic and fiberglass?" To answer this, respondents have to match

'plastic and fiberglass' in the question to the label, 'Plastic & Fiberglass,' in the column intersecting list to identify the answers 'Shaping,' 'Light Stock Removal,' and 'Finishing and Scuffing.' (In this case, 'node' would refer to the entire list of items labeled ' Plastic & Fiberglass').

In *cycle tasks*, users perform an iterative series of locate matches, within a given list or between lists . Cycle tasks within lists often involve the selection of items that meet a particular criterion. An example of such a task would be one which requires users to list the various grades of 'fine' sandpaper mentioned in Figure 1. To complete this, users would have to match on the word 'fine' five different times to arrive at the list: 'Fine,' 'Very Fine,' 'Extra Fine,' 'Super Fine,' and 'Ultra Fine.' Other cycle tasks, such as represented by question (1) above, require users to first locate information in one document and then, matching on the answer found in this list, make a new locate match. This may or may not result in the identification of the final answer, as additional cycles may be necessary before a final answer has been located. (In (1) above, only one cycle is necessary since, once users have identified 'F' under Garnet, they have only to search on 'F' to find that it refers to 'Fine' sandpaper.) Cycle tasks are further made difficult depending upon whether the cycles are *independent* (i.e., the answer identified in one match is not used to carry out a second match, such as in listing the grades of 'fine' sandpaper) or dependent (i.e., the answer identified in one match is used in the process of performing a second match, such as first locating the sandpaper type 'F' and then having to match on 'F' to find 'Fine').

Integrate tasks require users to compare or contrast information that has been located in two or more different locate matches or one or more cycle matches. For instance, an integrate task applied to Figure 1 would be, "Imagine you needed to sand both wood and metal between coats of paint and you were planning to buy wetordry sandpaper. Identify the abbreviation of the sandpaper type which you could use for both wood and metal." To answer this, users would have to locate 'Between Coats' in both the 'Wood' and

'Metal List' in the document, as well as the 'Wetordry' list (see Figure 1). They would then have to identify which type of sandpaper could similarly be used for wood and metal (answer is 'SF').

Matching is also made difficult as the *number of features* required to locate an answer increases. Matches which require the identification of only a single feature are, on average, easier than matches which require the identification of two features; matches requiring two feature matches are easier than three or four feature matches. To illustrate this, consider the previous question, "According to the abrasive selection guide, what three sanding operations apply to plastic and fiberglass?" To answer this, respondents have only to match 'plastic and fiberglass' in the question to the corresponding 'Plastic & Fiberglass' in the document. This would be scored as requiring only a single locate match. On the other hand, if this question had been worded, "According to the abrasive selection guide, what sanding operations applies to plastic and fiberglass when using medium production sandpaper?," this would require respondents to match on three features, i.e., 'Plastic & Fiberglass,' 'Production,' and 'Medium' in order to identify the answer, 'Light Stock Removal.'

Matching is further made difficult depending upon the *number of responses users must supply* and *whether or not the number of responses, if greater than one, is specified in the question or directive.* Questions and directives requiring respondents to list only one answer are easier than those requiring respondents to list two or three answers; questions and directives requiring respondents to list two or three answers are easier than those requiring respondents to list four answers. Questions and directives which specify the number of multiple responses to be listed are easier than those which do not specify the number of responses explicitly.

Finally, matching is made difficult to the extent that users have to make *inferences* either to match information in the question or directive to information in the document or the extent to which users have to make inferences in selecting or

interpreting an item once identified as satisfying requested information. For instance, a question asking respondents to list the types of sandpaper found in the abrasive selection would be difficult because it would be unclear whether "types" referred to such things as 'production,' 'garnet,' 'wetordry,' etc., or to 'extra coarse,' 'coarse,' 'medium,' 'fine,'. etc. Furthermore, without the combined list telling what sandpaper abbreviations refer to, respondents would have a difficult time answering such questions as (1) above; in such a case, an inference or reference to prior knowledge would have to be made in order to answer this question. (The list of rules for scoring type of match for documents are presented in Appendix A.)

In addition to type of information requested and type of match, a third process variable is *plausibility of distractor* (Kirsch & Mosenthal, 1989). This variable has to do whether or not there are features from a question or directive's given and/or requested information which appear in the document but, once matched or identified, do not yield the correct requested information. Based on previous research, Kirsch & Mosenthal (1989) found that tasks are easiest to process when there are no plausible distractors in a document. This is often the case when there is only a single item in a list or there is only one list with a unique label unrelated to the other labels in a document. For example, in terms of the abrasive selection guide, the question, "Does this guide contain safety information?," has no plausible distractors; 'Safety Information' is the label in one list which is unrelated in kind to 'Materials,' 'Operations,' and types of sandpaper.

Tasks become slightly more difficult when there is more than one item in a list in which one is searching for requested information or when there are labels in other lists that bear resemblance in kind to the label on which one is searching. This is the case, for instance, in Figure 2 , where we find two sandpaper grades (i.e., 'FV' and 'EF') in the list labeled 'Fre-Cut.'. Questions made in reference to these target items (e.g., "What is

the second type of sandpaper listed under Fre-Cut?," (answer 'VF')), are made difficult due to the occurrence of other items in the list (e.g., 'EF').

Tasks become more difficult when one or more features from both given and requested information appear in different matrix cells or lists other than the cell or list in which an answer actually appears. An example of this would involve the question, "When finishing fiberglass, what type of pre-cut sandpaper does the abrasive selection guide recommend that you use?" Ideally, to answer this, respondents would match on 'Fiberglass,' 'Finishing,' and 'Fre-Cut' in order to identify the sandpaper type as 'VF' (i.e., 'Very Fine'). However, note that 'Finishing' also appears as an operation under 'Metal' and there are two grades of sandpaper in the list of sandpaper grades listed 'pre-cut.' In this regard, respondents might identify the wrong grade sandpaper by identifying a grade associated with the list labeled 'Finishing and Polishing,' or they might mistakenly select 'EF' instead of 'VF' from the list of pre-Cut sandpaper grades.

Tasks continue to increase in difficulty when one or more features from both requested and given information appear in the same matrix cell or list other than the answer node An example of this would involve the question, "For what materials is coarse sandpaper recommended for light stock removal?" In this case, the answer is found by matching on the column labeled 'C,' the row labeled 'Light Stock Removal' and finding the intersected cell darkened. From there, the label (i.e., 'Metal') associated with 'Light Stock Removal' is identified as the answer. However, one could similarly match on 'C,' and the row labeled 'Heavy Stock Removal,' thereby overlooking the important condition that stock removal should be 'Light 'rather than 'Heavy.' Finding the intersected cell darken, respondents might identify the wrong material as 'Wood.'

Tasks are most difficult when one or more features from both requested and given information appear in the same matrix cell or list as the answer. The selection of one feature over another as constituting the correct answer usually requires an inference or reference to conditional information stated in the document outside the answer node itself

and not in the question or directive itself. An example of this would have occurred in the abrasive selection guide if there had been a statement something to the effect that 'Fiberglass is more scratch resistant than plastic.' In answering a question such as, "Which production sandpaper should you use to finish and scuff plastic?," respondents would fine two plausible answers having matched on 'Finishing & Scuffing' and 'Production'--namely, 'F' and 'EF.' Based on conditional information (or knowledge), respondents would need to know that 'EF' would be less harsh and, hence, the appropriate choice to make over 'F,' which is more suitable to fiberglass than plastic. In such an instance, 'F' would be a requested information distractor found in the given information node defined by the intersection of 'Finishing & Scuffing' and 'Production.' (See Appendix A for a list of scoring rules for plausibility of distractors for document tasks found on the ETS Test.)

Based upon an analysis of the ETS Test of Applied Literacy skills, Kirsch and Mosenthal (unpublished paper) have found that they were able to account for 81 percent of the *R*-squared difficulty of the document tasks (measured in terms of RP80 scores) with following variables constituting significant predictors of variance: (1) type of match, (2) plausibility of distracting information, and (3) number of labels.

Respondents Performance on the Document Scale

The baseline performance of 22 respondents on the document pretest and the performance of 22 respondents on the document posttest are noted in Table 2. Here we see that the average number of errors on the document pretest was 9.53 errors, while the average number of errors on the document posttest was 5.30. Of the eight people who took both the pre-and posttest before and after treatment, we see that there was a significant ($p < .05$) difference in the number of errors before the treatment than after. However, given the small number of respondents who took both the pre-and posttests compared the entire treatment group who did not take both, the significant decrease in error scores is a token indicator at best of overall treatment effectiveness.

Table 2

Summary Statistics of Respondents' Performance on the Pre-and/or Posttest Versions of the Document Test of Applied Literacy Skills

Performance on the Document Pretest (Form A)	Performance on the Document Posttest (Form B)	Comparison Between those Respondents Taking both Pre-and Posttest Before and After Treatment
N= 22	N= 22	df = 7
Mean= 9.53 errors	Mean = 5.30 errors	t = 2.88
SD = 9.55	SD = 5.12	$p < .05$

To establish a baseline understanding of the ability of respondents who did, in fact, take the ETS document tests (either Form A or B, or both), we analyzed respondents errors by variable constructs. These results are shown in Table 3. What this table demonstrates is that, as the variable for type of match or plausibility of distracting information became generally more difficult, respondents had a more difficult time in processing the tasks.

Notice in Table 3 that, on average, respondents who made an error based on type of match were most likely to make this error when it involved integrating information. They were less likely to make this error for cycle; and least likely to make the error for locate. Similarly, based on plausibility of distractor, respondents who made errors were more likely to make an error when a task involved highly distracting extraneous information. They were somewhat less likely to make errors when the distracting information was moderate, and even less likely to make errors when the distracting information was hardly present (or not at all).

Given the few number of respondents who took both the pre-and posttest, it is not possible to make a general statement of trend where improvement occurred in the overall respondents. However, it is interesting to note that those who did take both the pre-and posttest tended to improve significantly in their ability to cycle. Overall, the

Figure 3

Money Rates

MONEY RATES

	Thurs.	6 mo. ago	Yr. ago
Prime lending	10.00%	8.50%	8.75%
Fed discount	6.50%	6.00%	6.00%
Broker call loan	9.13%	7.63%	8.13%
Mortgage rates			
30-yr. fixed-rate (FHLMC)	10.65%	9.85%	10.63%
30-yr. adjustable (FHLMC)	8.16%	7.53%	7.84%
15-yr. fixed rate[1]	10.39%	9.75%	10.28%
ARM index (1-year Treas.)	8.24%[2]	6.63%	7.41%
Money market accounts, latest 7-day average			
Money mutual funds[3]	7.37%	6.05%	6.03%
Banks and S&Ls[4]	5.81%	5.59%	5.47%
Treasury security rates			
3-month T-bill discount[4]	7.26%	5.74%	6.45%
6-month T-bill discount[4]	7.40%	5.93%	6.72%
7-year note	6.85%, -.01	8.12%	9.22%
30-year bond	9.03%, -.03	8.55%	9.57%

1—*Bank Rate Monitor* 2—week ending Sept. 2
3—*Donoghue's Money Fund Report* 4—Sept. 6 auction

THE DOLLAR

(Reduced from original copy.)

percentage number of cycle errors dropped from the pretest to the posttest from 42 to 29 percent. No such significant change occurred in the overall percentages in any of the other construct variable categories.

Table 3

Percentage of Respondents Making Errors by Construct Variables of Increasing Difficulty on the ETS Document Scale

Type of Match		
Locate	Cycle	Integrate
23%	38%	49%
Plausibility of Distractor		
Low Distractor	Medium Distractor	High Distractor
21%	35%	44%

Quantitative Analysis

A Model of Quantitative Processing

With the exception of two additional stages, the processing of quantitative tasks can be accounted largely by the document model shown in Figure 1. To understand this, consider the document in Figure 3 and the following seven quantitative processing stages.

Stage 1: Identify a goal. As in document processing, the first stage in quantitative processing requires that respondents begin by identifying a goal or purpose for using a document. This can be illustrated by the following question which applies to the money rate schedule in Figure 3:

Insert Figure 3 about here

> Using Thursday's rates, how much more interest should you have earned in money market accounts provided by mutual funds than by S&Ls?

In this instance, respondents' goal in using a document might be to identify whether it is better to invest their money in a mutual or S&L fund.

Stage 2: Identify the given and requested information. In this stage, readers must again distinguish between the "given" and "requested" information. In light of question (2), the given information would be, "Using Thursday's rates, you should have earned more interest in money market accounts provided by mutual funds than by S&Ls." The requested would be, "How much more interest = ?"

Stage 3: Search the document to match requested and given information to corresponding document information. In this stage, respondents search the document to identify information which corresponds with information provided in the question or directive. For instance, in answering (2) above, users may begin by attempting to identify 'money market accounts.' Having identified this, they might then use two-feature cycling to identify 'money mutual funds' and 'banks and S&Ls' and the 'Thurs.' list of percentage rates. Having completed these matches, respondents would then turn to Stage 4.

Stage 4: Fill in the requested information based on the information clues provided in the document. In this stage, respondents identify the missing requested information. In the case of answering question (2), this might result in respondents identifying the average rates of '7.37%' for mutual funds and '5.81%' for S&Ls.

Stage 5: Verify the sufficiency of the requested new information. At this point, users may recycle to earlier stages to ensure that all the conditions specified in a question or directive have been adequately addressed.

Stage 6: Formulate math problem. In this stage, the numbers identified through document processing are placed into an equation with an identified operation (e.g., addition, subtraction, multiplication, or division). This may be signaled by such terms in the question as, 'what is the difference,' 'what is the total,' 'how many more,' and 'how many fewer' (In question (2), this is signaled by the phrase 'how much more).

Stage 7: Carry out the calculation. At this point, respondents carry out the required mathematical operation necessary to produce an amount as type of information requested. In the case of question (2), this stage would involve respondents subtracting '5.81%' from '7.37%' to arrive at the answer '1.56%.'

Quantitative Variables

Structure and process variables. Since the first five stages in processing quantitative literacy tasks are similar to those of document processing, it was hypothesized that many of the document variables identified earlier should also influence quantitative processing. Thus, the same scoring procedures for the number of items, the number of labels, type of match, and plausibility of distractor, as used in scoring document structure and processing, were used to operationalize variables predicted to influence the difficulty of quantitative processing. Because the type of information requested in quantitative tasks is always an amount, this variable was not included in this analysis.

To account for the ease by which respondents could formulate a math problem in Stage 6 above, we used Kirsch and Mosenthal's (unpublished paper) variable called *operation(s) specificity*; this variable refers to how explicit an operation is for relating information found in the question and/or a document. For instance, when a question instructed respondents to 'add,' 'subtract,' or 'multiply' a set of numbers, operation specificity was said to be high. When such an operation required a high-text based inference or specialized prior knowledge (such as in knowing how to relate numbers in determining interest on a loan), operation specificity was said to be low. (The rules for scoring this variable are listed in Appendix B.)

Furthermore, to account for the ease by which respondents could calculate numbers to arrive at a determined amount in Stage 7 above, used Kirsch and Mosenthal's (unpublished paper) variable called *calculate*. This variable scored tasks requiring a single addition or subtraction as being easier than those which required a single

multiplication or division. In turn, these tasks were scored as being easier than those which required multiple calculations (such as an addition followed by a multiplication). (The rules for scoring this variable are also listed in Appendix B.)

Based upon an analysis of the ETS Test of Applied Literacy skills, Kirsch and Mosenthal (unpublished paper) have found that they were able to account for 83 percent of the *R*-squared variance for the difficulty of documents (measured in terms of RP80 scores) with following variables constituting significant predictors: (1) type of match, (2) type of calculation and (3) operation specificity.

Respondents Performance on the Quantitative Scale

The baseline performance of 27 respondents on the quantitative pretest and the performance of 23 respondents on the quantitative posttest are noted in Table 4 Here we see that the average number of errors on the quantitative pretest was 6.70, while the average number of errors on the document posttest was 7.22. Of the eight people who took both the pre-and posttest before and after treatment, we see that there was a significant ($p< .05$) difference in the number of errors before the treatment than after. Again, however, given the small number of respondents who took both the pre-and posttests compared the entire treatment group who did not take both, the significant decrease in error scores is a token indicator at best of overall treatment effectiveness.

Table 4

Summary Statistics of Respondents' Performance on the Pre-and/or Posttest Versions of the Document Test of Applied Literacy Skills

Performance on the Quantitative Pretest (Form A)	Performance on the Quantitative Posttest (Form B)	Comparison Between those Respondents Taking both Pre-and Posttest Before and After Treatment
N= 27 Mean= 6.7 errors SD = 5.55	N= 23 Mean = 7.22 errors SD = 5.52	df = 7 t = 2.97 $p < .05$

To establish a baseline understanding of the ability of respondents who did, in fact, take the ETS quantitative tests (either Form A or B, or both), we again analyzed respondents errors by variable constructs. These results are shown in Table 5. Again, what this table demonstrates is that, as the variable for type of match or plausibility of distracting information became generally more difficult, respondents had a more difficult time in processing the tasks.

Notice in Table 5 that, on average, respondents who made an error based on type of match were much likely to make this error when it involved cycling than simply locating information. Moreover, based on type of calculation, respondents were more likely to make an error when a task involved multiple operations (e.g., an addition followed by a multiplication) than they were then they only had to multiply or divide once. On the other hand, they were more likely to make errors when a task required them to multiply or divide than when the task required respondents to add or subtract.. Finally, respondents were more likely to make errors when operation specificity was moderate to very difficult than when operation specificity was easily recognized or inferred.

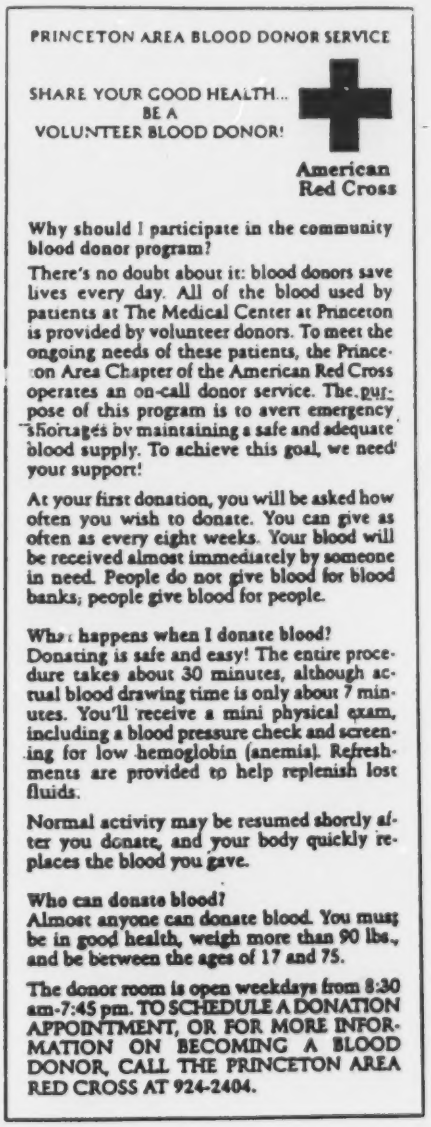
Table 5

Percentage of Respondents Making Errors by Construct Variables of Increasing Difficulty on the ETS Quantitative Scale

Type of Match		
Locate 13%	Cycle 87%	
Type of Calculation		
Addition/Subtraction 12%	Multiplication/Division 37%	Different Types of Calculation 61%
Operation Specificity		
Set Up Easy 29%	Set Up Somewhat Difficult 35%	Set Up Very Difficult 36%

Figure 4

The Blood Donor Pamphlet



PRINCETON AREA BLOOD DONOR SERVICE

SHARE YOUR GOOD HEALTH...
BE A
VOLUNTEER BLOOD DONOR!

American
Red Cross

Why should I participate in the community blood donor program?

There's no doubt about it: blood donors save lives every day. All of the blood used by patients at The Medical Center at Princeton is provided by volunteer donors. To meet the ongoing needs of these patients, the Princeton Area Chapter of the American Red Cross operates an on-call donor service. The purpose of this program is to avert emergency shortages by maintaining a safe and adequate blood supply. To achieve this goal, we need your support!

At your first donation, you will be asked how often you wish to donate. You can give as often as every eight weeks. Your blood will be received almost immediately by someone in need. People do not give blood for blood banks; people give blood for people.

What happens when I donate blood?

Donating is safe and easy! The entire procedure takes about 30 minutes, although actual blood drawing time is only about 7 minutes. You'll receive a mini physical exam, including a blood pressure check and screening for low hemoglobin (anemia). Refreshments are provided to help replenish lost fluids.

Normal activity may be resumed shortly after you donate, and your body quickly replaces the blood you gave.

Who can donate blood?

Almost anyone can donate blood. You must be in good health, weigh more than 90 lbs., and be between the ages of 17 and 75.

The donor room is open weekdays from 8:30 am-7:45 pm. TO SCHEDULE A DONATION APPOINTMENT, OR FOR MORE INFORMATION ON BECOMING A BLOOD DONOR, CALL THE PRINCETON AREA RED CROSS AT 924-2404.

Given the few number of respondents who took both the pre-and posttest, it is not possible to make a general statement of trend where improvement occurred in the overall respondents. However, it is interesting to note that of those who did take both the pre-and posttest, this group tended to improve significantly in their ability to both cycle and perform a single multiplication or division. Overall, the percentage number of cycle errors dropped from 19 percent from the pretest to the posttest. Similarly, the overall percentage of errors in tasks requiring multiplication or division dropped 11 percent. No significant changes were found for respondents in terms of operation specificity.

Prose Analysis

A Model of Prose Processing

Search in prose differs from search in documents given that the former is usually carried out over information arrayed in paragraph formats while the latter is carried out over information organized in matrix formats. Also, information units in documents are usually clearly identifiable due the presence of labels; in contrast, information units in prose are usually not identifiable apart from the infrequent use of headings and glosses. However, apart from these differences, the stages of search in prose are similar to the stages of search in documents (Carpenter & Just, 1975; Singer, 1990). These stages are illustrated for prose search using the blood donor brochure in Figure 4 below.

Insert Figure 4 about here

Stage 1: Identify a goal. As was the case for document and quantitative literacy, users begin processing prose by identifying a goal or purpose, often established in an assessment by the question or directive provided. For instance, a

question which users of the blood donor brochure in Figure 4 might consider is the following:

> (3) What is the actual length of time that it takes to draw blood from a donor?

In this instance, respondents' purpose in reading the brochure might be to determine how long the blood drawing procedure actually takes.

Stage 2: Identify the given and requested information. Having represented a goal as a question or directive, readers proceed to Stage 2. In this stage, respondents must distinguish between the given and requested information. In applying this strategy to question (3), respondents would identify the given information as "It takes an actual length of time to draw blood from a donor." They would identify requested information as "actual length of time = ?"

Stage 3: Search the document to match requested and given information to corresponding document information. In this stage, respondents would begin by first searching on information in the requested information frame to make a match between this information and corresponding prose information. In those cases where no such corresponding information could be located, respondents would then proceed to match on information in the given information frame.

Using question (3) above to illustrate this stage, we note that readers could match 'actual' in the requested information frame to the word 'actual' in the brochure's sentence ,'The entire procedure takes about 30 minutes, although actual blood drawing time is only about 7 minutes.' Readers may further cycle back to given information to match on the words 'draw' and 'blood.' Having completed these matches, users would then turn to Stage 4.

Stage 4: Fill in the requested information based on the information clues provided in the document. In this stage, users identify the missing requested information. In the case of answering question (3), respondents would identify the

requested information as '7 minutes' (and hopefully would avoid the time amount of '30 minutes' as a distractor in the answer node!).

Stage 5: Verify the sufficiency of the requested new information. To ensure that the correct requested information has been supplied, respondents may recycle to earlier stages to ensure that all the conditions specified in a question or directive have been adequately addressed. In the case of question (3), users may recycle to verify that the answer was '7' rather than '30' minutes.

Prose Variables

Structure variables. Similar to the document scale analysis, both structural and process variables were hypothesized to influence the difficulty of the tasks on the DOL prose scale (cf. Carpenter & Just, 1975; Singer, 1990). To assess the influence of structure on prose task difficulty, each prose stimulus on the ETS prose scale was analyzed in terms of its: (1) number of words, (2) number of sentences, (3) average number of words per 100 words, (4) average number of syllables per 100 words, and (4) readability level (as measured using the Fry, 1977, readability formula).

Process variables. As with the document scale, Kirsch and Mosenthal (unpublished paper) have identified three process variables which include: (1) type of information requested, (2) type of match, and (3) plausibility of distractors. The same basic scoring rules for *type of information requested* used in the document analysis were used in the prose analysis. For instance, the type of information requested in (3) above is amount information (i.e., length of time). For the question, "What characteristics must you have in order to donate blood?" (answer 'Anyone who is in good health,' 'weighs more than 90 pounds,' and 'be between the ages of 17 and 75'), the type of information requested was condition information.

As in the document analysis, the variable *type of match* refers to the processes required to relate information in the question or directive to corresponding information in the prose stimulus; it also includes the processes of entering one or more responses

as answers to requested information. In *prose locate tasks*, difficulty was conditioned by the following. First, locate tasks in which readers were able to match on information in the requested information frame were easier than those in which readers could only match on given information. Moreover, matches based on given information were made more difficult as the number of features in given information increased. Thus, tasks in which given information consisted only of a single feature were easier than those in which given information consisted of two or three features.

In addition, locating becomes more difficult as the number of features required to locate requested information increased; thus, tasks in which requested information could be located via a single feature match are easier than those in which requested information could only be located via a two or three feature match. Moreover, locating becomes difficult to the extent that inferences have to be made or specialized knowledge is drawn upon either to match information in the question to information in text and/or to select one plausible answer over another in a paragraph node. In some instances, tasks on the ETS prose scale are further made difficult when the answer to requested information appears in a paragraph either before or after the paragraph in which a question-to-text match had been made. Finally, locate matches are made more difficult as the number of required responses increases and when the number of multiple responses to be provided is left unspecified.

In *prose cycle tasks*, users perform an iterative series of locate matches, within a given paragraph or between paragraphs. These tasks are difficult for the same reasons that locate tasks are difficult. In addition, cycle tasks are more difficult as readers move from cycling within paragraphs to cycling between paragraphs to identify information belonging to the same category (e.g., 'health hazards') or meeting a given criterion (e.g., 'current advantages of a new bank service').

Similar to document integrate tasks, *prose integrate tasks* require users to compare or contrast information that has been located in two or more different locate

matches or in one or more cycle matches. These tasks are difficult for the same reasons that locate and cycle tasks are difficult, e.g., as the number of responses required to complete a question increase, the difficulty of the integrate task increases.

In sum, the rules for scoring type of match on the ETS prose scale are somewhat similar to the rules for scoring type of match for tasks on the ETS document scale (see Appendix C for a list of scoring rules for type of match for prose tasks). The major differences are that a distinction is made between matches which are based on requested vs. given information, the number of features in given information, and the location of an answer within or outside of the paragraph in which the question-to-text match had been made. Also, the notion of "node" in prose referred to a paragraph rather than a matrix cell of document list. Thus, cycling and integrating are said to take place within or between paragraphs rather than within or between matrix cells or lists.

The third process variable which Kirsch and Mosenthal (unpublished paper) have examined in prose is *plausibility of distractor.* This concept is similar to the variable by the same name in the document scale analysis. The only difference in prose is that "node" refers to a paragraph. To illustrate this, consider the rule stated earlier that "distractors for both given and requested occur before the answer but in different nodes." In prose, this rule means that features from both the question's given and new information frames occur in the text but in different paragraphs from one another and in a different paragraph than the one in which the answer is located. Apart from the way a node is defined, the same scoring rules of plausibility of distractors can be used for prose tasks as for document tasks.

Based upon an analysis of the ETS Test of Applied Literacy skills, Kirsch and Mosenthal (unpublished paper) have found that they were able to account for 78 percent of the *R*-squared difficulty of the documents (measured in terms of RP80 scores) with following variables constituting significant predictors of variance: (1) type of match, (2) type of information, and (3) plausibility of distractors.

Respondents Performance on the Prose Scale

The baseline performance of 26 respondents on the quantitative pretest and the performance of 32 respondents on the quantitative posttest are noted in Table 6. Here we see that the average number of errors on the quantitative pretest was 9.42, while the average number of errors on the document posttest was 8.09. Of the four people who took both the pre-and posttest before and after treatment, we see that there was not a significant ($p > .05$) difference in the number of errors before the treatment than after. Again, however, given the small number of respondents who took both the pre-and posttests compared the entire treatment group who did not take both, the non significant decrease in error scores is a token indicator at best of overall treatment effectiveness.

Table 6

Summary Statistics of Respondents' Performance on the Pre-and/or Posttest Versions of the Document Test of Applied Literacy Skills

Performance on the Prose Pretest (Form A)	Performance on the Prose Posttest (Form B)	Comparison Between those Respondents Taking both Pre-and Posttest Before and After Treatment
N= 27 Mean= 6.7 errors SD = 5.55	N= 23 Mean = 7.22 errors SD = 5.52	df = 3 t = .77 p <>.05

Again, to establish a baseline understanding of the ability of respondents who did, in fact, take the ETS prose tests (either Form A or B, or both), we again analyzed respondents errors by variable constructs. These results are shown in Table 6. Again, what this table demonstrates is that, as the variable for type of match, type of information, and plausibility of distractors became generally more difficult, respondents tended to make more errors in completing the prose tasks.

Notice in Table 7 that, on average, respondents who made an error based on type of match were much likely to make this error when it involved cycling than either integrating information or simply locating information. Based on type of information,

respondents were more likely to make an error when a task involved highly abstract information, such as identifying a theme or explanation.. Finally, respondents were more likely to make errors as the plausibility of distractors increased in difficulty.

Table 7

Percentage of Respondents Making Errors by Construct Variables of Increasing Difficulty on the Prose Scale

Type of Match		
Locate 25%	Cycle 44%	Integrate 31%
Type of Information		
Highly Concrete 14%	Moderately Abstract 29%	Highly Abstract 43%
Plausibility of Distractor		
Low Distractor 19%	Medium Distractor 38%	High Distractor 57%

As there were few respondents who took both the prose pre-and posttest and as there were no differences between the pre-and posttest scores, no attempt was made to analyze changes in respondents' pre-posttest construct patterns.

Analyses by Level

What emerged as useful information from the ETS test data was that it provided a useful baseline for profiling at least 50 to 60 people who participated in the program in terms of their overall document, quantitative, and prose literacy skills. Based on analysis of each respondent's ability to complete tasks analyzed by construct variable difficulty, we identified the following overall pattern of proficiencies (cf. Kirsch, Jungeblut, & Campbell, 1992). Approximately 13 percent of the respondents were limited such that they could perform primarily "Level 1" tasks. *Level 1* tasks tend to be the easiest for adults to process. Document tasks at this level typically involved one-feature, one-response literal or synonymous locate tasks, with no plausible distractors, in which the type of information requested includes relatively concrete information

(i.e., persons, animal, thing, attribute, amount, type of, temporal, action, or location). Prose tasks at this level are similar to document tasks in that they largely involve one-feature, one-response literal or synonymous locate tasks and the same types of requested information. They differ however, from document tasks in that they typically include a distractor from either given or requested information which appears in a paragraph other than the one in which the answer appeared. Quantitative tasks at this level tend to involve addition or simple subtraction with the number already set up in some column or row format.

Another 17 percent of the respondents who took one or more ETS tests demonstrated ability to perform primarily "Level 2" tasks. *Level 2* tasks are of slightly greater difficulty for adults. Document tasks at this level involve two-feature, one-response literal or synonymous locate tasks or simple one-feature, one-response cycle tasks (independent and dependent), with plausible distractors for either or both given and new appearing in different nodes from one another and not in the answer node. The type of information requested at this level includes manner, goal, purpose, attempt, condition, pronomial reference, and predicate adjective. Quantitative tasks at this level involve only one-feature, one-response literal or synonymous locate tasks, with no distractors for either given or new information appearing in a node other than the answer. Prose tasks at this level are again similar to document tasks in terms of plausibility of distractors and requested information. In terms of type of match, prose tasks differ in that, in addition to requiring respondents to locate and cycle, these tasks also require respondents to identify a familiar theme based on features within a paragraph. Calculate at this level involves primarily addition with operation specificity explicitly stated.

Yet another 39 percent of the respondents demonstrated skill reflective primarily of "Level 3" literacy abilities. *Level 3* tasks are tasks of medium difficulty. Document tasks at this level involve more complicated locate and cycling tasks, as well

as simpler integrate tasks. Locate tasks involve making a literal two feature match, followed by a two-or-three item response, with the number of responses to be provided not specified in the question. Cycling involves making a series of two-feature, literal or synonymous dependent matches. Integrate tasks require making a series of two or more, one-feature matches in which information within nodes is then compared or contrasted. Plausible distractors include given and requested information appearing in the same node but in a node other than the one in which the answer appeared. The type of information requested includes cause, effect, reason, result, evidence, similarity, and explanation. Quantitative tasks at this level include simple cycle tasks and lower levels of plausibility of distractors, such as are found in Level 2 for type of match for document processing. Calculate involves subtraction, as well as addition, with operation specificity either expressed using relational terms or else requiring low text-based inferencing. Prose tasks are similar to documents tasks at this level in terms of type of match, plausibility of distractors, and type of information requested.

Still another 26 percent of the respondents could perform "Level 4" tasks with a fair degree of regularity. *Level 4* tasks represent difficult tasks. Document tasks at this level include locate tasks involving multiple feature matchings, multiple responses (involving four or more responses), with the number of responses not specified; these tasks also involve more complex integrate tasks involving cycling and inferencing in which one set of information in a given node has to be selected over a second information set in the same node using conditional or specialized knowledge. Plausible distractors for documents include, in several instances, the case where the both given and requested appear in the same node as the answer. Type of information requested includes several equivalents. Quantitative tasks at this level include more complex cycle tasks requiring multiple feature match in each cycle. These tasks involve distractors for both given and requested appearing in the same node but not in the answer node. Calculate involves multiplication and division, with operation specificity requiring rather high text-based

inferencing. Prose tasks at this level are similar to documents at this level in terms of type of match, plausibility of distractor, and type of information requested.

Finally, only five percent of the respondents who participated in this evaluation's treatment were able to perform at "Level 5." *Level 5* tasks are the most difficult tasks by far. Document tasks at this level require respondents to either generate information in making a match or providing an answer or by integrating information based on multiple-feature matches with a single item response. Again, distractors for both new and requested often appear in the same node as the answer. Type of information requested included combinations of different types of information (e.g., a time plus a conditional) as well as equivalents and differences. Calculate usually involves multiple calculations and often specialized knowledge of how to set up a problem into its proper equation.

Note, that when compared to distributions of previous adult literacy assessments (Kirsch et al., 1992), the above distribution of literate abilities closely reflects a similar pattern to that of the national average. Also from an instructional point of view, observe that the range of skills of individuals who participated in this programs' treatments is indeed quite high, suggesting the important need to be able to tailor instruction to individual's level of literacy proficiency.

PART II

Profiling Workers' and Supervisors' Perceptions

Materials

A pre-post *Curriculum Knowledge Test* was constructed by teachers for each class and administered by trainers to all participants. Because this was not generalizable across training sites, and because the tests were prepared by the teachers as diagnostic tools, it was not suitable to consider these assessments within the larger job profile. Further, teachers report that such tests were not administered for all classes because they would have frustrated workers with low skills relative to required

testing tasks. However, test results are reported within the larger context of qualitative reports of workers' change and client satisfaction.

A *Client Satisfaction Interview* (see Appendix D) was developed to collect anecdotes relative to program value. These open-ended interviews were conducted with a purposeful sampling of participants and supervisors to indicate qualitative dimensions of client satisfaction. Spokespersons were selected by teachers as "People who seem to represent the kind of students you had in this class." A content analysis was used to consider all of these responses to the Client Satisfaction Interview.

Monitoring took place via traditional means. Project attendance data, meeting minutes, curriculum development files, and correspondence were all used to gauge the extent to which project personnel fulfilled the obligations set forth in the original grant agreement. A *Compliance Monitoring Tool* (see Appendix E) was used to consider the extent to which delivery matched original objectives. This included use of interviews with project personnel to gain a sense for all the perspectives on issues that had impact upon curriculum development and delivery efforts. A content analysis was also used to consider these additional results.

Worker/Client Satisfaction

Client Satisfaction Interviews were administered to a sampling of workers and supervisors[11] represented by each of the classes that were held under the auspices of the grant. Results to this segment of the evaluation indicate some success relative to perceptions of value for courses that were conducted under the auspices of this grant. In two cases, reports indicate some differences in perception of the value of classes that were offered.

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1 Companies will be known as Company A. B, etc., to assure confidentiality of clients.

It should be noted that elements of the interview asked workers and supervisors to consider more concretely the impact of the course on production so that cost-benefit calculations could be conducted. Questions were asked about the reduction of waste, errors, down time, and, quite directly, any other indications by which cost-benefit could be calculated. However, only personnel from one department could actually point to a substantial reduction in numbers of errors directly attributable to course content. Others were able to discuss changes in skills and attitude, and many reported that they believed that the long-range benefits of education outweighed the short-term costs. However, most seemed reluctant to attribute changes in productivity statistics to the impact of grant-sponsored courses.

Company A. This company offered four classes under the federal Workplace Literacy Demonstration Project grant. These were called "Metric Conversion for Blueprint Reading," two sections called "Math for SPC" and Metric Immersion," reaching a total of 40 workers. The client satisfaction interview suggested that, across constituents, there was a high level of satisfaction concerning the value of the classes. The training coordinator was especially supportive of the activities that were sponsored by the grant.

> "I think the classes were successful from my perspective and from a management perspective. And an unanticipated by-product is the camaraderie, with big brother helping little brother. . . And supervisors helped, too. One supervisor gave a guy his car to get to class, and that really shows people that you care. . . Because we're dealing with 2,500 plant population, we need more teachers and more classes."

Metric Conversion for Blueprint Reading. This course was offered to workers in the packing and shipping department. Three workers from Metric Conversion for Blueprint Reading participated in interviews. All reported that they learned a simple formula and use of a calculator for conversion as well as reading all the indications on

blueprints. One of the interviewed workers reported that he had learned all of the information in other, previous classes, while the others reported that they used the information from class every day, and that the class meant fewer errors in identifying parts from blueprints. "People are taking more time to really check the blueprints, where before, they were just guessing." All involved seemed to like the instructional design and to enjoy the humor of the instructors.

> "I think some of the guys were surprised at the how well they did since many had been out of school for 20 or 30 years. It wasn't as difficult as they imagined it would be."

One student mentioned that it seemed like there were a large number of instructors (e.g., 2 for job skills and 2 teachers) for a relatively small number of workers. Another student recommended more use of actual parts on the job. A third suggested that it may be more efficient to hold classes right at the plant instead of at the Training Center nearby.

All workers reported that they attended on company time and that work was easily made up by the manner in which the group was divided for covering jobs. All mentioned that their success was tied to improved self esteem and improved confidence on the job, however, all noted that no advancement was likely to result from what they had learned and that this was a result of their placement. Two of the three decided to take other classes as a result of their experiences in the class and encouragement they received during construction of an Individual Development Plan.

Supervisors of this department were equally confident in the worth of the course, noting that, after the course, the department went an entire year before making any mistakes, compared to the previous year when they had made mistakes costing the company several thousands of dollars. "The guys have gotten so good at reading blueprints that they have identified errors made by the engineering department." While the cost was great--$20 per hour per worker for two hours per class--both

supervisors thought the class succeeded beyond their expectations and created a new community among the workers.

Math for SPC. Two small classes were run for machine operators on two different shifts. Students noted that, while they were good at their jobs, they needed to read charts that were sometimes confusing to them. Of this group, two were interviewed to gain a sense for relative merits of the offering. As with Math for Blueprint Reading, clients seems satisfied; no recommendation were made to the course developers or teachers.

Both workers noted that they were quicker at reading SPC charts, and that they understood certain aspects of the charts that they had not understood before. Neither felt their was likelihood of promotion as a result of the course. Both also mentioned appreciating the opportunity to get to know other workers with jobs like theirs. Experiences in the course changed the way both learners thought about their own learning.

> "I always thought I was slow. Now I don't think so. A lot of it is--you don't take time to think. You just figure you're slow., and that's it. And now I have more confidence in what I do."
>
> "Whatever I'm doing has got to be right. They don't like no junk hitting the line. . . Now I don't have the fear. ! know my figures are right, and where I have to put them. Now I can run a chart, and explain it. Now I don't have to worry about the fear. "

Both students seemed to appreciate instructional design and environment. "I don't think I could want a better teacher," and "The teacher has been great because she takes her time and answers questions" are among the reports by these two workers. Neither had recommendations.

Metric Immersion. This course was offered for skilled trades persons. The two workers who were interviewed noted that the course did not have immediate application

for them since "conversions between standard and metric is usually right on the blueprints." However, both reported that they gained confidence regarding their conversion skills. They reported that the company was moving toward a goal of being able to serve foreign clients when automatic conversion would be necessary, so both appreciated the opportunity to gain in skills. They, too, attended class on company time.

Both workers appreciated the atmosphere. Both reported that they had always taken classes and that the work load in this class seemed reasonable by comparison. One worker, with experience at organizing training, thought they could use more homework, a more intense course schedule, and even "off time" class time.

> "Ten of us were put into a pilot program after interviews. When I saw the request, I wondered what they could put into a course that would take 15 weeks. There was quite a bit of apprehension until the first week. After the first week we have really been gung ho, although if I maintain 20% it will be good because I don't use it every day."

Company B. Two classes were taught at Company B for all workers in the Maintenance Department: Math for Maintenance and Technical Documentation. Both classes were taught on company time, and all workers were required to take the course. Upon completion of these courses, workers were offered the opportunity to take follow up courses at a local technical college. Perceptions about the effectiveness of the grant-sponsored classes at the company site were mixed, as is reported in the section that follows[2].

Math for Maintenance. Two workers were interviewed regarding the effectiveness of the course. Both workers reported that they felt that they were effective on the job. One noted that he had always done a great deal of mathematics and taken many courses

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2 It should be noted that, due to difficulties in scheduling, there was an extended amount of time between completion of classes and the interviews upon which this report was based. This delay may have impacted individuals' ability to remember.

"I learned quite a bit. There's always something you can learn. I liked the instructors. . . The class was a little more simple [than others I have attended], so it was kind of a review for me."

Neither of the two maintenance workers reported that the course changed the way that they do their jobs. In one case, the worker reported that he used mathematics a great deal on the job. In the other case, the worker reported that he never used mathematics on the job, and that, in fact, his supervisor could not understand how he could do the work that he did so well without it. He noted that "I have my own way of doing my job, and it doesn't really involve math." He continued,

"Math kills me. I've never used it in my line of work, and I could never do it when I was a kid either. . . Math for maintenance just about knocked me out. The course at the technical college kept me awake nights, so I figured it wasn't worth it. . . [I would recommend teachers] emphasize the practical side of maintenance. Here it is and here's how it works. I learned from other people who knew the job. . . but there isn't time for that any more."

Neither worker noted an influence on their participation in other educational opportunities; one worker reported that he always took classes, and the other reported that he had no interest in such pursuits.

Technical Documentation. Neither worker had much to report about the impact of their participation in the technical documentation course. "I can't really say I got much our of it" and "Keep up the good work" were as detailed as either participant seemed to be able to remember about what they learned in the course. However, one supervisor reported that when the class was offered the students looked at the job-related literacy tasks and made recommendations for significant changes in a work order form that were followed up on by the company.

This supervisor seemed to feel that both courses were most worthwhile and said, "I think it prepared them well for specific skill training. . . and it served to bring them together better as a team. . . If we don't provide more opportunity, than nothing is going to change. Their level before was not acceptable. . . We want them to know that we view them as a valuable section of the business, and that hasn't happened here in all areas yet." This same supervisor anticipated a change in errors and scrap but noted that there was not a specific way of documenting such change.

> "The way things were being done was just to replace the part that was broken rather than reworking the problem. Don't just do something because it's always been that way. And they reformed the work order, and that's been better."

This supervisor also had specific ideas for Training Center staff to consider. The supervisor noted that the workers had fun in class but:

> "They had difficulty seeing the connection between the general and the skill on the job. Stuff may have been a little too easy or too laid back, because when they hit the college level class some of them are taking right now, they freaked. We had to work with their new instructor a bit"

Another recommendation was that future requests for workers to do activities should include all tasks in the initial planning phase. That is, if workers need to take pre- and post-tests, participate in class, complete and Individual Development Plan, and participate in an exit interview, then staff should ask for all of the time up front to make it easier on floor supervisors to plan for absence or down time. A request was also made for an earlier report of literacy assessment results.

Another supervisor reported that he was less satisfied with the outcomes of the courses that were offered. He reported that the Math for Maintenance course appeared to address workers at their level, but that it in no way prepared them for the college level courses in which they were now supposed to be involved.

"As soon as we got to the math part of the hydraulics course [the college-level course offered after workers' participated in Math for Maintenance], you saw the brakes being applied. No connections were made. If they're going to do it again in another company, they've got to finish what they started."

He saw no impact from the Technical Documentation course either, and noted that none of the workers makes any reference to the class at the present time. He also explained that he joined the company after the course had already been initiated, so he did not have as much opportunity to participate.

Company C. Company C offered one class to workers in its Molding Department as a pilot opportunity to consider applying the model within other portions of the company. Participants and one supervisor had nothing but praise for the course, while another supervisor seemed unclear about the long range plan by which the course was offered.

Math for Charting. Workers reported that the class taught them how to calculate percentages and decimals on the calculator so that they could better read and calculate efficiency and scrap tables. This class, too, was conducted on company time. Neither worker who was interviewed saw promotion arising out of their participation as both liked their jobs. Both noted that, as a result of the course, they were saving time and making fewer mistakes. One reported "I feel like they're looking to the future. They know we don't have much schooling." Another said:

"I only went to ninth grade, so these new charts were confusing. I was just guessing. . . Who ever came up with this idea, it was a great idea. Some of us didn't even know how to use a calculator."

Both workers also noted a change in their attitudes toward learning. Reported one, "I always figured I couldn't learn. I even surprised myself." Another said,"

"I love . I learned a great deal. Sometimes I thought I never would, but I did. . . I just can't wait until Thursday for class. I didn't think I could

learn as much as I did in that short a time period. I have foster kids, and I can help them more by coming to school. I also talked to Margaret [a teacher] about school. You're never too old to learn. All it can do is help you."

Two supervisors were also interviewed. One reported that while workers seemed to be learning a great deal from the course and that he was happy with the camaraderie it was building,

"I don't expect any change [on the job]. If anything, they might have a different look at the company. One of the things I'm having a little problem with is that we're not making machinery parts that have little tolerance. So for our type of work, math is not usually important. Charting doesn't affect errors, and making a cast has no math involved. The only math they use is counting the castings."

This same supervisor, who participated in the class whenever he could, noted that the instructional design seemed suited to the mixed abilities of the students in the group. Thus, he had no recommendations for instruction. However, he mentioned that he was not sure of the company's final goal for participating in the overall program.

Another supervisor noted that the class was meant to prepare the workers to begin to do some SPC charting on their jobs, that the class was very well suited to workers who had little experience at using such processes.

"Three or four have said something to me, which in itself is unusual. Everybody is enjoying the class, so it's more than I hoped it would be. . . We've had an advantage in that we're not particularly busy. To take advantage of the Training Center opportunity was almost a no brainer."

This supervisor expressed some frustration at the amount of time it took project staff to get the course started after the initial decision about what class and what department would be affected.

PART III

Project Compliance with Grant Guidelines

The original grant proposal stated that "It is the purpose of the proposed Workplace Literacy Program to demonstrate a successful model for: (1) recruiting and enrolling 240 participants with inadequate basic skills; (2) providing job-related workplace literacy training that increases current job skills and chances for advancement; (3) preparing workers for new technologies and operating methods.

In general, Region 9 Training Center staff were to provide instruction to consortium members in how to recruit, enroll, and counsel workers in need of context-specific skills instruction. They were also to develop workers' Individual Development Plans, both for advancement and individual skill development. They were to analyze tasks of jobs identified as in need by labor-management teams from each company to develop customized training, incorporating on-the-job materials and situations as well as group and individualized instruction.

To meet this requirement, project staff implemented the steps outlined in the grant proposal for initiating a course within a company. Staff report that once jobs were identified, these steps also included the formation of labor-management marketing teams and conducting of a series of meetings among workers, supervisors, management and course staff to ensure clear understanding of class parameters (e.g., goals of instruction, time for meeting, attendance policy, worker obligations) and requirements. Finally, literacy audits were conducted and courses developed with grounding in actual needs of workers on the job. As was proposed in the grant application, instructors were hired with background knowledge suited to teaching the material required for course success.

Meeting minutes were also used to document the fact that meetings took place within and across all six participating companies as outlined in the grant document. Bi-monthly project Advisory Board meetings were also held to give staff an opportunity to update companies on grant progress and to give labor-management representatives a chance to talk among themselves about approaches to recruitment and enrollment.

Records also indicate that job task analysis took place in five of six companies but that, due to a variety of circumstances beyond the control of the project, classes taught by project staff took place only in three of the companies, serving a total of 67 workers. During the time period covered by the Training Center grant, one of the participating plants was targeted for shut down, so education efforts were centered on job retraining instead of contextualized learning as was sponsored by this grant. Another company was purchased by a different parent company midway through the funding period--followed by lay offs of nearly 100 workers and drastic internal reorganization--so identification of target jobs could not take place in a timely fashion. A third company also experienced lay offs of hundreds of workers and supervisors--including the training representative of the labor-management team--and this called to a halt the processes by which courses could be offered within the plant.

Staff believed that the quagmires at the above three companies forced delays that affected services to other companies. That is, working on a literacy audit and attempting to set up a class according to grant specifications during lay-offs took time and energy away from bringing other projects to fruition even as eager companies sat in the wings waiting for services. Class start ups were also delayed by vacations and shut down periods. Staff expressed frustration that three of the classes were running right up to the end of the funding period[3].

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3 Collection of evaluation data was also frustrated by untimely completion of grant obligations.

Delays also frustrated staff members' abilities to arrange for timely completion of workers' Individual Development Plans, although long-range educational planning was alluded to frequently during classes so that workers would begin to consider other opportunities that might be available. Staff also expressed some frustration at not always understanding of the scope-and-sequence of the long-range educational objectives; in one case, a course was designed to suit workers' needs and on-the-job requirements without understanding that workers were to be prepared for college-level coursework upon completion of the Training Center sessions.

Records indicate that attendance was reasonable for all classes, ranging from 73% to 100% for all nine classes. In addition, almost all teacher-made , pre-post tests showed gains from the beginning to the ending of classes that were offered.

Other specifics relative to grant compliance may be found in the *Compliance Monitoring Tool* (see Appendix E) and in Table 1.

Part IV

Discussion and Recommendations

Taken together, client satisfaction interviews and compliance monitoring suggest some measure of success, qualitatively speaking, for the OCM-BITS Workplace Literacy project. Some significant areas of frustration also exist among staff and some participants. Training Center staff and other labor-management participants in the OCM-BITS project will want to consider several implications of the above evaluation results as they plan future training activities.

For example, it appears to be the case that company's long-rage educational goals are not always clear to Training Center staff as they embark upon course development and delivery. Further, not all constituents who were to be affected by a specific course seemed to understand what to long-range goals of such courses were. If training is to continue in these specific sites, participants should investigate further the miscommunications that have occurred thus far. In general, companies and program

staff should be certain that plans and objectives are communicated and understood by all parties.

Decisions about operation, shut downs, and lay-offs forced some delays upon course implementation. These delays, in turn, rippled through the project, causing delay in start up of classes in companies who were ready and waiting for classes. Staff, in turn, asked for bits and pieces of company's time for testing, completion of Individual Development Plans, instruction, and exit interviews. These, in turned, caused some frustration at plants that wished to be able to plan ahead for all interruptions. Companies and Training Center staff should make a commitment to a specific timeline for participation at the project's inception. This timeline should be approved at all levels of the company's hierarchy so that only the most significant unavoidable concerns interrupt service to potential participants.

Pre-post administration of assessment was not consistent, yielding evaluation results based upon only a few matched pairs. In addition, company representatives have expressed a desire to know workers' profiles as classes are in session. Thus, assessments associated with evaluation should be administered consistently and scored promptly, producing profiles that can be useful to company planners as well as to curriculum developers.

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Appendix A:

Scoring Rules for Document Variables

Type of Information

Score 1 when the type of requested information makes reference to a *person, animal,* or *thing.*

Score 2 when the type of requested information makes reference to an *attribute, amount, type of, temporal, action,* or *location.*

Score 3 when the type of requested information makes reference to a *manner, goal, purpose, attempt, alternative, condition, pronomial reference,* or *predicate adjective.*

Score 4 when the type of requested information makes reference to a *cause, effect, reason, result, evidence, similarity,* or *explanation.*

Score 5 when the type of requested information makes reference to an *equivalent,* a *difference, theme,* or to any *combination of types of information* found in 1-4.

Type of Match

Score 1 when a *locate* task requires a:
-1 feature, literal or synonymous match requiring a 1 item response.
when a *cycle* task requires:
-series of identical, 1 feature, literal or synonymous independent matches applied recursively with the number of items to be listed is specified and involves multiple responses.

Score 2 when a *locate* task requires a:
-2 feature, literal or synonymous match requiring a 1 item response.
-1 feature, low text based inference match with a single item response; or
-1 feature, literal or synonymous match requiring a 2-3 item response and with the number of items to be listed is specified.
when a *cycle* task requires a:
-series of different, 1 feature, literal or synonymous independent matches applied recursively with a 1 item response.

Score 3 when a *locate* task requires a:
-1 feature, literal or synonymous match with a 2-3 item response and with the number of items to be listed is specified; or
-2 feature match, one of which is literal or synonymous and one which requires a low text based inference with a 1 item response.

Score 4 when a *locate* task requires a:
-3 feature, literal or synonymous match with a 1 item response;
-2 feature, literal or synonymous match with 2-3 item response and with the number of items to be listed is not specified;
-2 feature, literal or synonymous match, followed by a single item response which requires a low text based inference to be identified with a 1 item response; or
-1 feature, high text based inference match requiring a single item response.
when a *cycle* task requires a:
-series of different, 2 feature, literal or synonymous dependent matches applied recursively requiring a 1 item response;
-series of different, 3 feature, literal or synonymous independent matches applied recursively requiring a 1 item response;
-series of different, 1 feature, literal or synonymous dependent matches applied recursively requiring a 1 item response selected by a low text based inference; or
-series of different, 2 feature, literal or synonymous independent matches applied recursively requiring a 1 item response selected by a low text based inference.
when an *integrate* task requires that
-features based on two or more, 2 feature matches be used to locate additional features which are then compared or contrasted with a single item response;
-features based on two or more, 1 feature matches are used to locate additional features which are then compared or contrasted with the number of items to be listed is specified with a 2-3 item response; or
-series of different 1 feature, literal or synonymous, independent cycle matches are used to locate additional features which are then compared or contrasted requiring a single item response.

Score 5 when a *locate* task requires a:
-4 feature, literal or synonymous match with a 1 item response;
-1 or more feature, literal or synonymous match, followed by a single item response which requires a high text based inference to be identified;
-3 feature, literal or synonymous match requiring a 2-3 item response and with the number of items to be listed is not specified;
-2 feature, literal or synonymous match requiring 4 or more item response with the number of items to be listed is not specified; or
-1 or more feature, generate match (requiring the use of prior or specialized knowledge) requiring a 1 or more item response.

when a *cycle* task requires a:
-series of different, 1 feature, literal or synonymous dependent matches with the number of items to be listed is not specified and requiring a 5 or more item response;
-series of different, 3 feature, literal or synonymous dependent matches applied recursively with a 1 item response;
-series of different, 4 feature, literal or synonymous independent matches applied recursively requiring a 1 item response;
-series of different 1 feature, literal or synonymous dependent matches applied recursively with a 1 item response selected by a high text based inference; or
-series of different, 2 feature, literal or synonymous independent matches applied recursively with a 1 item response selected by a high text based inference.
when an *integrate* task requires that
-features based on two or more, 3 feature matches be used to locate additional features which are then compared or contrasted requiring a single item response;
-features based on two or more, 2 feature matches be used to locate additional features which are then compared or contrasted with the number of items to be listed is specified and requiring a 2 or more item response;
-features based on two or more, 1 feature matches be used to locate additional features which are then compared or contrasted with the number of items to be listed is not specified and requiring a 2-3 item response; or
-series of different 1 feature, literal or synonymous, independent cycle matches are used to locate additional features which are then compared or contrasted with the number of items to be listed is specified and requiring a 2 or more item response.

Plausibility of Distractors

Score 1 when plausible distractors do not appear for either given or requested information.

Score 2 when plausible distractors for either given or requested (but not both) appear in a node other than the answer node.

Score 3 when plausible distractors for both given and requested appear in different nodes other than the answer node.

Score 4 when plausible distractors for given requested both appear in the same node other than the answer node.

Score 5 when plausible distractors for given requested both appear in the same node as the answer.

Appendix B:

Scoring Rules for Selected Quantitative Variables

Operation Specificity

Score 1 if operations required for relating numbers are explicitly stated or identified (e.g., the terms 'add,' 'subtract,' 'multiply,' indicate total,' or 'divide' or the symbols '+,' '-,' 'x,' etc.) appear in the question, directive or the document.

Score 2 if operations required for relating numbers are signaled by relation terms (Such as 'how much less,' 'how many more,' 'what percentage, 'what's the difference').

Score 3 if operations required for relating numbers need to be determined based on a low text based inference drawn from information in the question or directive.

Score 4 if operations required for relating numbers need to be determined based on a high text based inference drawn from information in the question or directive.

Score 5 if operations required for relating numbers necessitates the use of special prior knowledge (e.g., requires knowledge of how to figure a tip or the interest rate of a loan).

Calculate

Score 1 if calculation requires a single addition.

Score 2 if calculation requires a single subtraction.

Score 3 if calculation requires a single multiplication.

Score 4 if calculation requires a single division.

Score 5 if calculation requires any combination of addition, subtraction, multiplication, and division.

Appendix C:

Scoring Rules for Selected Prose Variables

Type of Match

Score 1 when a *locate* task requires a:
-1 feature, literal or synonymous match based on information in the new information frame with a single item response with answer in the new information frame node.

Score 2 when a *locate* task requires a:
-1 feature literal or synonymous match based on information in the new information frame with a 2-3 item response and with answer appearing in the new information frame node; or
-1 feature literal or synonymous match based on given information frame consisting of one or two features to search with a single item response with answer in the new information frame node.

Score 3 when a *locate* task requires a:
-1 feature literal or synonymous match based on given information frame consisting of one or two features to search on with multiple item response with number of responses specified in the question or directive;
-1 feature literal or synonymous match based on given information but to complete new information frame requires a low text base inference; or
-identify a set of conditions which meet a particular criterion.
when a *cycle* requires a:
1-feature literal or synonymous match based on given information frame consisting of one or two features to search on with multiple item responses with the number of responses specified in question or directive.
when an *integrate* task requires a:
-theme be identified based on familiar features within a paragraph.

Score 4 when a *locate* task requires a:
-1 feature literal or synonymous match based on given information frame consisting of three or more features to search on with multiple item response with number of responses specified in the question or directive;
-1 feature match made using a high text based inference with a single item response; or
-1-3 feature literal or synonymous match followed by a single response selected via a low text based inference.
when a *cycle* task requires a:
-a series of cycle matches from paragraph to paragraph to identify a response which matches a search condition inferentially.
when an *integrate* task requires a:
-a series of cycle matches be made in which features are identified and then compared or contrasted with a 2 or more item response with the number of responses specified.

Score 5 when a *locate* task requires a:
-1 feature literal or synonymous match based on given information frame consisting of three or more features to search on with multiple item response with number of responses not specified in the question or directive.
when an *integrate* task requires a:
-theme be inferred based on highly figurative language often made across a series of paragraphs.

when a *generate* task requires a:
-use of esoteric or specialized knowledge to generate a response not directly inferable from text.

Client Satisfaction Interview

To be Interviewed: Date: _____
Company

_____ Class Participant #1
_____ Class Participant #2

I am here as part of the evaluation of the classes that BOCES has been developing with the National Workplace Education Project. You have been recommended as someone with particular insight into the class and its benefits.

Please be as honest as you can be. It will help staff with later course development and with evaluation report. All of what we discuss here is confidential.

1. What did you learn from the course Math for Maintenance? How have you used what you have learned?

2. What department do you work for? What is your job? How do you know when you have done your job well? How did this course affect your ability to do your job? Others in your department?

   a. What were you able to do differently on the job as a result of this course? Did the course help you perform job tasks differently? Faster? With fewer errors? Saving materials? Less down time ? How?

   b. Do you feel that what you learned in the course made you more productive in other ways on the job? How? What would management say?

   c. Did this course cause you to think about your job differently? How?

3. What were the trade-offs involved in devoting time to this course? Did you come on your own time? Are there activities you gave up, on the job or at home, to participate? (e.g., Less time on the job? Less time reading?)

4. Have your relations with other workers or supervisors changed since you took this course? How?

5. Have you advanced in your job since the course? Why? Is it related to what was learned in the course?

6. Has this course had any impact on the way you think of yourself as a learner? How? Do you think this is true for other people who took the course? Have you embarked on any other kinds of learning since taking this course?

7. How would <u>you</u> assess the worth of this course?

8. Have you attended other classes similar to this one? How does this program compare to others that you have attended?

To be Interviewed: Date: _____
Company Name:

_____ Supervisor #1
_____ Supervisor #2

I am here as part of the evaluation of the classes that BOCES has been developing with the National Workplace Education Project. You have been recommended as someone with particular insight into the class and its benefits.

Please be as honest as you can be. It will help staff with later course development. All of what we discuss here is confidential.

1. What is the product of this department?

2. What were the goals for this course, from a management perspective?

3. Do you think these goals were achieved? What evidence do you have that this is true? (List by goal.)

4. What have class participants been able to do differently as a result of their training?

5. Have you noticed any difference in attitude as a result of this course?

6. Has efficiency or productivity changed as a result of this course?

   a. What kind of errors did workers make before the course? At what cost? Has this changed? What is the evidence?

   b. What was the rate of downtime before the course, and has this changed?

c. Would you say that the cost of training these workers is less than, equal to, or greater than the cost of production? Why? What does this suggest about future programs?

d. Are there activities that workers had to give up, at work or at home, to participate?

e. What other benefits have been derived from the course? Do these outweigh costs? What is the evidence?

f. What, specifically, were the benefits to workers of taking this course (e.g., promotion, salary, more responsibility)?

7. Has this course changed relations between this an other people or units in the plant? How so?

Appendix E:

Compliance Monitoring Tool

Phase 1

Start-Up Goal One:

TO ESTABLISH A WORKPLACE LITERACY PROGRAM THAT ATTRACTS WORKERS WHO HAVE BEEN HESITANT TO PARTICIPATE IN TRAINING BY REMOVING ANY BARRIERS OR STIGMAS THEY MAY HAVE EXPERIENCED THAT WOULD PROHIBIT THEM FROM PARTICIPATING IN SKILL IMPROVEMENT CLASSES.

Objective 1: To increase the support of Syracuse Union/Management Consortium for the program by briefing all levels of management and supervisors about the program.	This was addressed in all companies through marketing teams as explained in the grant proposal, but the attempt appears to have been more successful in some settings than others (see Client Satisfaction section for more information).
Objective 2: To increase program support from all elected and appointed labor representatives in the plant by briefing them about the program.	These individuals were invited to briefings held by members of the marketing team in each company.
Objective 3: To develop a marketing strategy and materials that will reflect the joint support of Labor and Management for the program.	All marketing teams had both labor and management representatives as key participants. In addition, all companies are represented on the project Advisory Board by individuals from both groups.
Objective 4: To recruit and enroll no less than 60 workers in the project.	Eighteen workers were enrolled in the project during the first three months, 30% of the target figure.
Objective 5: To maintain the support of the project, at least one planning meeting of the Consortium members will be held during the start-up phase.	This meeting took place as scheduled.

Start-up Goal Two:

TO ESTABLISH A WORKPLACE LITERACY PROGRAM THAT PREPARES WORKERS FOR MAKING THE BEST USE OF NEW TECHNOLOGY AND NEW OPERATING METHODS IN ORDER TO INCREASE JOB SECURITY, LIKELIHOOD OF ADVANCEMENT AND MAINTAIN VIABILITY IN THE CONTEMPORARY WORKPLACE.

Objective 1: To increase the involvement of Managers in developing training programs by including no less than four (4) managers or supervisors in curriculum and evaluation design activities.	Managers were involved in literacy audits in each of the five companies within which such audits were conducted. Seven managers were included in the Client Satisfaction Interviews. One manager from each company participated in the Advisory Board.
Objective 2: To increase the involvement of Labor in developing training programs by including no less than four (4) Union members, recognized for their Union members, recognized for their expertise on the shop floor, in curriculum and evaluation design activities.	Union leaders were involved in literacy audits in each of the five companies within which such audits were conducted. Seven union members participated in the Client Satisfaction Interview. One union representative from each company participated in the Advisory Board.
Objective 3: To identify and analyze approximately 10 key Job Tasks that the skill levels have increased as a result of technology changes; these tasks will be those perceived as problem areas to or by workers.	Project Personnel identified and analyzed 11 key job tasks. Instruction took place in 9 of those settings.
Objective 4: To individualize and customize the training curricula by incorporating examples from workers' job task(s) in the training materials.	All curricula involved use of on-the-job tasks and materials (see project curriculum guides).

Start-up Goal Three

TO ESTABLISH A WORKPLACE LITERACY PROGRAM THAT ENCOURAGES WORKERS TO CONTINUE PARTICIPATING IN TRAINING NEEDED TO MEET COMPETITIVE CHALLENGES IN THE WORLD MARKET.

Objective 1: To increase the information available to workers about changes in technology or operating processes by publishing articles each quarter in Consortium Local Union and Plant newsletters throughout the duration of the project.	Staff published information about and results of classes in company newsletters at appropriate times during project operation.

Phase II

Project Goal One:

TO RECRUIT AND ENROLL WORKERS WHO NEED IMPROVEMENT IN THEIR BASIC WORKPLACE SKILLS AND PREPARE INDIVIDUAL DEVELOPMENT PLANS FOR INCREASING THEIR JOB RELATED SKILLS.

Objective 1: To recruit and enroll no less than 180 workers in addition to the 60 workers who were enrolled in the start-up phase.	Forty-nine additional workers were enrolled after the target period, yielding 27% of the total anticipated. Overall, staff enrolled 28% of the target enrollment.
Objective 2: To provide Individual Counseling and prepare Initial Individual Development Plans (IDP) for the 240 enrolled workers.	IDPs were prepared for 36, or 54%, of the 67 enrolled workers. IDPs could not be prepared for 33 other workers whose participation was not completed at the time these data were collected.
Objective 3: To provide career counseling and formal skill assessment services to at least 45 of the workers enrolled in the basic skills improvement and GED components and to update their IDPs to establish the sequence of skill upgrading sessions needed.	Career counseling took place at the time the IDP was completed for the above 36 workers.
Objective 4: To refer any worker for whom the Basic Skills Improvement or GED program is not appropriate (does not match the worker's needs) to the Counselor/Case Manager for help in exploring other education and training options available through the plant, Regional 9 Training Center, or in the community.	All workers with basic skills difficulties were referred to the Case Manager for additional assistance.
Objective 5: To maintain support for the program from the Consortium by providing them with written reports each month and by meeting with them at least every other month throughout the duration of the project implementation phase.	Monthly updates were provided by project staff members and bi-monthly reports given at Advisory Board meetings.

Project Goal Two:

TO PROVIDE INDIVIDUALIZED JOB RELATED BASIC SKILLS INSTRUCTION AT CONVENIENT LOCATIONS, ON A FLEXIBLE SCHEDULE AND THE SUPPORTIVE SERVICES NECESSARY TO ASSURE PARTICIPANT SUCCESS.

Objective 1: To provide no less than 240 workers with job related basic workplace skills instruction and to achieve at least an 85% successful completion rate as measured by achievement of IDP goals.	IDP goals of most workers were fairly general. However, nearly all workers who began each class completed it with an increase from pre- to post-test teacher-made test score.

Objective 2: To serve, on an open entry-open exit basis, 115 workers in the Workplace Communication, Problem Solving and Decision Making component of the program.	Communications, taught in a course called Technical Documentation, were taught to 16 workers in one company. Staff report that such a course appeared not to be appropriate for other job-specific requirements.
Objective 3: To serve, on an open entry-open exit basis, 110 workers in the Basic Skills Improvement component of the program.	Sixty-seven workers were served in the Basic Skills Improvement portion of the project.
Objective 4: To serve, on an open entry-open exit basis, 15 workers in the GED component of the program.	Per reviewers comments, the project itself did not have a GED component, although GED classes are ongoing at each of the plants.
Objective 5: To provide bi-weekly follow-up with each participant throughout the duration of the project and to provide referral to child care or transportation assistance to those who request it.	Staff report that bi-weekly follow up with each participant did not appear to be appropriate given the manner in which the design came to fruition. Child care and transportation were available to all who needed it.

Project Goal Three:

TO ENCOURAGE WORKERS TO CONTINUE THEIR EDUCATION SO THEY ARE PREPARED TO ADAPT TO NEW CHANGES IN TECHNOLOGY OR OPERATING METHODS.

Objective 1: To update the IDP of each worker whenever an identified goal is reached as a means of rewarding the worker and encouraging him/her to continue setting and achieving additional training goals.	IDPs were updated for 36 individuals at the end of project funding
Objective 2: To sponsor one Conference on new technology and competitiveness for all program participants during the 9th month of the project.	Project staff sponsored a workplace literacy conference on new technology and competitiveness roughly one-third of the way through funding.
Objective 3: To update the IDP for 50% of the program participants who complete the basic skills instruction to encourage them to continue training through other UAW-Chrysler, Consortium or Community Based training programs.	Such encouragement was provided at the time of IDP updating.

Objective 4: To track those program participants who enroll in other sponsored training programs for one year after their participation in the project and encourage them to continue their training.	This objective is not yet measurable.

Objective 1: To increase the involvement of Managers in developing training programs by including no less than four (4) managers or supervisors in curriculum and evaluation design activities.	Managers were involved in literacy audits in each of the five companies within which such audits were conducted. Seven managers were included in the Client Satisfaction Interviews. One manager from each company participated in the Advisory Board.
Objective 2: To increase the involvement of Labor in developing training programs by including no less than four (4) Union members, recognized for their Union members, recognized for their expertise on the shop floor, in curriculum and evaluation design activities.	Union leaders were involved in literacy audits in each of the five companies within which such audits were conducted. Seven union members participated in the Client Satisfaction Interview. One union representative from each company participated in the Advisory Board.
Objective 3: To identify and analyze approximately 10 key Job Tasks that the skill levels have increased as a result of technology changes; these tasks will be those perceived as problem areas to or by workers.	Project Personnel identified and analyzed 11 key job tasks. Instruction took place in 9 of those settings.
Objective 4: To individualize and customize the training curricula by incorporating examples from workers' job task(s) in the training materials.	All curricula involved use of on-the-job tasks and materials (see project curriculum guides).

Start-up Goal Three

TO ESTABLISH A WORKPLACE LITERACY PROGRAM THAT ENCOURAGES WORKERS TO CONTINUE PARTICIPATING IN TRAINING NEEDED TO MEET COMPETITIVE CHALLENGES IN THE WORLD MARKET.

Objective 1: To increase the information available to workers about changes in technology or operating processes by publishing articles each quarter in Consortium Local Union and Plant newsletters throughout the duration of the project.	Staff published information about and results of classes in company newsletters at appropriate times during project operation.

Phase II

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Objective 4: To track those program participants who enroll in other sponsored training programs for one year after their participation in the project and encourage them to continue their training.	**This objective is not yet measurable.**

UAW-CHRYSLER
REGION 9 TRAINING CENTER
6075 E. Molloy Road
Syracuse, New York 13211
(315) 463-7185

To: Workplace Literacy Dissemination Centers
From: Carol Turnbull, Project Counselor/Case Manager/Instructor
Re: Case Management
Date: March 30, 1993

Included in this packet is information that is vital to the documentation of this project:

* An agenda for the Advisory Board Meetings
* A sample from the New Process Gear Newsletter
* A sample of the form used for the Individual Education Plan
* A sample of a Student Certificate of Award
* The sample of the registration form for classes
* A sample of the brochure for the External Diploma Program
* The fact sheet documenting the companies in the grant
* An Instructor/Consultant Reference form
* Copies of the Task Analysis Forms:
  - Interview used for the worker
  - Also one for the supervisors

During the course of this project many activities formed the basis of this position. Recruitment was an essential part of the program. Personal contact with the program participants began with in-plant tours, cafeteria registration for Tech Prep, "hand-billing" the plant at gates, attending company "Open Houses"------ all designed to be a friendly, familiar face before, during, and after the actual job-specific/contextualized instruction.

At the initial meeting of each course offered, the participants were introduced to all personnel and phases of the class---pre/post assessments, course outline and IEP's.

Full involvement in the planning stages, as well as serving as an instructor and/or tutor for some of the classes, gave this Project Counselor/Case Manager position an added dimension---providing additional information/contact with participants' abilities, skill levels and interests needed for development of customized Individual Education Plans.

Workplace Communications, Problem-Solving/Decision-Making courses were offered to Consortium company/union members, as well as being integrated into the actual pilot programs. Team building skills were also included.

Personal contact with the Human Resource Directors and/or Educational Trainers of the participating companies/unions provided another important link to meeting individual needs.

Continual monitoring of participants' progress in meeting individual goals will provide important data in reviewing and ensuring future contexualized curricula development and in meeting basic skills, job-specific skills, and individual/personal needs.

If any further information is needed concerning this project, please contact Carol Turnbull at (315) 463-7185 or the Project Director, Jim Brower at (315) 451-6054.

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ADVISORY BOARD MEETING
JUNE 24, 1992
11:30AM - 1:00PM

****

*** Guest Speakers

1. Andre Dawkins,
   Deputy Commissioner for Employment
   and Training

2. Bobbie Clemente,
   UAW-Chrysler NTC, Center Facilitator

AGENDA

1. Presentation of Staff Make-up at Center
2. Evaluation Plan and Proposed Activities
3. 1992-93 State Workplace Literacy Budget
4. 1991-92 Final Budget Information
5. Activities and Classes that are Ongoing and Propcsed
6. Review of Literacy Celebration
7. Proposed Fall Programming and Staffing
8. Other Funding Streams for 92-93
9. Other

The NPG Trans Express

VOLUME 4 NUMBER 6
March 26, 1992

Don't Leave Work Without It!

New Process Gear, Division of New Venture Gear
6600 Chrysler Drive East Syracuse, New York 13057
(315) 432-4441

WHERE DOES MY PART GO?

by Bob Lavoie

On Friday, January 24, Jim Heaphy, one of our S.U. students, helped to launch a new program at NPG. Jim, along with Dept. 593 Supervisor Phil Bushallow, took 4 of Phil's workers on a trip through the ATX machining, dehicking and teardown areas. The purpose was to let Paul Winters, Smiley Frolick, Max Haines and Frank Fortunato know exactly what their parts do in the units and how important their operations really are. Some of these men knew some things about their part's functions, but I think overall, this tour was very enlightening. What made this event even more informative was the help that Jim Heaphy got from the jobsetter in the ATX area, Bob Tavernia. He took all of us from operation to operation, explaining what was happening and also what can happen if the parts are not done correctly when they get to his area. Everyone on this tour appreciated the knowledge that Bob had to share with them, and they also were grateful to all the workers in this area who didn't hesitate to help answer some of the questions being thrown around.

All in all, the hour or so that was spent in the assembly area was time well spent for everyone. Tours like this have been done in the past, but this was very well organized. Before the tour even started, everyone was shown a film on where and how the unit goes into a vehicle so they understood the process better. When the tour was finished, everyone came back to the P.Q.I.P. area and critiqued what had taken place. They all agreed it was fun, informative and should have been done years ago.

In reality, these men are right. This should have been done before, for everyone, but at least if we do it now, it will give us more knowledge on what we do. Hopefully, in the not too distant future, more and more of us will get this opportunity and take advantage of it.

"QUALITY"

by Bob 4th

A lot has been said and written about quality and what it means to us. What exactly does quality mean to us? Basically, our future.

To be able to produce fine quality in our products, we have got to develop fine quality in ourselves. This means in our work habits, our attitude towards the company and to our fellow workers. How well we perform a job is how well the job will turn out. Each of us is responsible for a specific job or operation and each time we do it, our attitude will determine to what extent of quality we will perform on the job or operation.

Attitude has a lot to do with each of our own working conditions and relationship between hourly and management. Since the start of P.Q.I.P. ten years ago, a lot of changes have taken place between management and hourly. With the inception of P.Q.I. teams, team members from both hourly and management meet weekly and talk over and resolve problems that, in the past, used to be swept under the rug. Very little problem solving was done and the attitude was very negative. Much has changed in the past ten years. Hourly and management can discuss and resolve many situations, resulting in a much more positive attitude. This has helped to create the much improved quality products we now build and ship to a satisfied customer.

If our economic system doesn't get any worse, then only good and better things are in our future, especially with the dedication we have from our P.Q.I.P. leaders and the Plant Steering Committee.

CONTEST #5

Here's the next contest. The deadline for entries is Tuesday, April 7, 1992. Give your entries to any Communications Team member or drop them off in our mailbox (#50) in the P.Q.I. offices.

Make sure you include your:

NAME: _____

DEPT: _____ SHIFT: _____

SLOGAN(s): 7C _____

Using SPC to be the Best YOUR TOOL FOR SUCCESS

submitted by Beth Pidkaminy

An SPC chart is not for your supervisor, area manager, or quality control person. It is for you. Use it as a tool to improve your process. So why report incorrect data?

Employees think if they keep their charts within the control limits, no one will bother them...WRONG... What happens when everything is in control and the department is full of scrap, and the non-conforming parts were found on the audit? Who loses?

As Americans, we need to change our way of thinking and use SPC as a tool for process improvement and ultimately satisfying the customer. Your customer could be GM, Chrysler, an assembly line, or the guy on the next machine. To satisfy your customer means making your parts the best to be competitive in the world market. Don't let Japan be correct with their statement of "illiterate and lazy Americans", because if you report incorrect data and make everything seem to look good, it gives Japan additional ammunition to add to the list. Japan will have won again!

BE FAIR TO YOURSELF
PROVIDE ACCURATE DATA
FOR YOUR CUSTOMERS

Staff

A publication of the Communications Team at New Process Gear

Linda Domres - **Editor**

Writers -
Bob Lavoie
Barb Smith
Kathy Hogle
Tony O'Malley
Kris Arcaro
Bob Forth

Photographer
Linda Domres

Layout -
Bonny Davis

Artist -
Harry Nasikan

UAW Facilitator
Bob Frank

Mgt. Facilitator
Dennis Fonehouse

It's a Blueprint Kind of Day

by Bob Lavoie

On Wednesday, January 29th, the workers in the service pack area received certificates and a calculator for the successful completion of the first special Blueprint Reading Class.

This course,which was specially funded by a Federal Grant, made it possible for these workers to have at least a working knowledge of blueprints to help them to make sure the right product gets to our service customers.

A reception line, which included Tony DeFrancesco, Marion Ervin Ron Kilmer, Paula Hayes, Carol Turnbull and instructors Bob Cameron and Fred Gonroff, congratulated each student and explained the importance of what they had achieved. NPG is one of seven Syracuse area manufacturing facilities involved in the Federal Grant for upgrading of worker skill levels. The others in the area include G.M., Syracuse China, Dietz, Oberdorfers, Crucible and Die Molding Companies.

This is just the beginning. In the not too distant future, courses in basic math and metric conversions will be given. All of these programs are a step towards upgrading the skill level of NPG people.

The Communications Team would like to salute the blueprint reading class graduates; Ken Dayer, Dick Kellish, Owen Jones, Nick Condes, Don Hurst, Gary Wells, Ray Crysler, John Hoyt, Sal Barbieri, Merle Meeks, Dick Loveless, Frank Pappalardo, Marion Baur, Pat Ryan, Dennis Piccolo and Tom Baker, and put the knowledge to good use.

UAW-CHRYSLER
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Syracuse, New York 13211
(315) 463-7185

INDIVIDUAL EDUCATIONAL PROGRAM

NAME _____

SOCIAL SECURITY NUMBER _____

PLACE OF EMPLOYMENT _____

EPE _____YES _____NO HIGHEST GRADE LEVEL COMPLETED _____

A. INITIAL INTERVIEW _____

_____

_____

_____

B. TESTING - TYPE FORM LEVEL DATE SCORES RDG MATH

_____ _____ _____ _____ _____ _____ _____

_____ _____ _____ _____ _____ _____ _____

_____ _____ _____ _____ _____ _____ _____

C. SHORT TERM GOALS: _____

_____

_____

TRAINING: (INCLUDE WHAT, WHERE, WHEN) _____

_____

_____

D. LONG TERM GOALS: _____

_____

_____

E. MATERIALS: _____

_____

_____

F. SUPPORT PERSONNEL: _____

_____

_____

_____
INSTRUCTOR'S SIGNATURE

SYRACUSE UNION/MANAGEMENT CONSORTIUM
UAW - CHRYSLER - G.M. REGION 9 TRAINING CENTER

Certificate

OF AWARD

To: _____ *Date:* _____

who has satisfactorily completed a course of study

in: _____

Instructor

Jim Brower
BOCES, Business & Industry
Training Coordinator

Tony DeFrancesco
UAW-Chrysler Co-Administrator

Omer R LaBrecque
UAW-G.M. Co-Administrator

OCM BOCES
Onondaga Cortland Madison

Center for Business and Industry Training Services
O-C-M BOCES/Syracuse Central Tech/Business and Industry

60

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(315) 463-7185

Registration Form

Name _____

Address _____

_____ Zip _____

Telephone _____ Soc.Sec# _____

County of Residence _____ School District _____

Plant _____ Dept. _____ Shift _____

Active _____ Lay-off _____ Spouse _____ Youth _____

Local Union _____

High School Diploma _____ Yes _____ No

Class _____

Class Day Mon.___ Tues.___ Wed.___ Thurs.___ Fri.___ Sat.___

Class Time _____

Start Date _____ End Time _____

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FACTS SHEET

WORKPLACE BASIC SKILLS IMPROVEMENT PROJECT

PROJECT OVERVIEW

The U.S. Department of Education has awarded a grant to the Syracuse Union/Management Consortium for the purpose of creating and implementing a model basic skills training program. As a result, six manufacturers in the Syracuse, New York area will be offering individualized workplace instruction to a minimum of 240 employees. This instruction will give union-represented workers the opportunity to make the best use of new technologies and operating methods, and to position themselves for job advancement. At the same time, the instruction increases the competitiveness of the participating companies.

WHO IS INVOLVED?

Onondaga-Cortland-Madison Counties, Board of Cooperative Educational Services Business and Industry Training Services (OCS-BOCES/BITS) will administer the grant for the Consortium members. The Consortium consists of

UAW-Chrysler Region 9 Training Center	
Crucible Steel	USWA 1277
Diemolding Corporation	UAW 1060
General Motors	UAW 854
	UAW 2164
New Process Gear Division	UAW 2149
	UAW 624
Oberdorfer	UAW 1826
Syracuse China	GMP 381

HOW IS INSTRUCTION DEVELOPED AND IMPLEMENTED?

Union and management will select workers to receive training at each plant. Then a thorough task analysis will be done by the educational team to determine basic skill instructional needs. Courses will be developed according to task analysis, and

instruction will be provided at each company site by OCM-BOCES staff who are experienced in working with adult learners.

In addition to job-specific basic skills training, workers will attend classes in problem-solving, decision-making, and communication skills. Educational skills programs that are identified as needed but not covered in the Federal grant funding will be offered through State grant funding.

Each worker selected for training will receive skills assessment to determine job-specific basic skills needs. Then an Individual Development Plan (IDP) package will be developed, defining job and training goals as well a plan for achieving those goals.

WHAT DO COMPANIES HAVE TO DO?

Each plant will appoint a Site Representative to coordinate program activities and serve as the initial employee contact. In addition, the plant will have a Marketing Team that is responsible for 1) promoting the program, 2) recruiting targeted employees, and 3) providing feedback to the Project Management Team. The Project Management Team consists of representatives from all organizations involved in the project.

WHY DO WE NEED THIS PROJECT?

Rapid changes in technology are driving advances in manufacturing. This means the level of workers' basic skills must increase. Companies across the U.S. must upgrade worker skills in order to remain viable in the expanding global marketplace. By joining forces --labor with management with educational institution-- we can meet the project goals and contribute to keeping America great.

UAW-CHRYSLER
REGION 9 TRAINING CENTER

6075 EAST MOLLOY ROAD, SYRACUSE, NEW YORK 13211
(315) 463-7185 FAX (315) 463-7576

WORKPLACE SKILLS IMPROVEMENT PROJECT
Instructor/Consultant Reference Form

Personal Information:

Name _____
Last First Middle
Address _____
_____
Zip code
Soc.Sec.#_____
Tel. (Home)_____
(work)_____

Areas of Expertise:
1._____
2._____
3._____
4._____
5._____

Educational/Work Experience:
_____
_____
_____
_____
_____

_____
FOR OFFICE USE ONLY _____

PROJECT COURSES/COMPANY NAME/SITE/TASK PERFORMED

1. _____
2. _____
3. _____
4. _____
5. _____

Company: Name:
Date of Interview:
Interviewer:

UAW-CHRYSLER REGION 9

TRAINING CENTER/OCM BOCES

WORKPLACE LITERACY SKILLS IMPROVEMENT PROJECT

Skills Upgrading Training

1. Describe your job:

   a. Title _____
   b. Types of work required (electrical, hydraulic, etc.)

   _____

   _____

   c. Range of technical requirements:
      - easiest (replace light bulb)
        - What's needed for knowledge/judgment?

   _____

   _____

   _____

      - most difficult
        - What's needed for knowledge/judgment?

   _____

   _____

   _____

   d. What does it take to be an expert at this job?

   _____

   _____

   _____

e. What tasks do you do MOST frequently?
- What's needed for knowledge/judgment?

e. What tasks do you do LEAST frequently?
- What's needed for knowledge/judgment?

2. What are your strengths/what are you best at?

a. How did you learn it?
(come with knowledge, learn on the job, learn outside)

b. Do other people do this task, too?

c. Do other people rely on you to do this?

3. What is your background?
   a. Education and training (in-house and outside)

_____

_____

_____

   b. Previous jobs/experience

_____

_____

_____

   c. What skills did you bring to this job?

_____

_____

_____

   d. Did you feel prepared to do this job when you came?

_____

_____

   e. How long have you been at Diemolding?_____
   f. What are your future career plans?
      - What do you need to know in order to get there?

_____

_____

_____

   g. What would it take for you to get promoted?

_____

_____

_____

h. How did you learn your job?

_____

_____

_____

i. How did you learn the vocabulary?

_____

_____

4. What are the 3 most important things that you need to know in your job? Why?

_____

_____

_____

_____

5. What are the 3 most challenging parts to your job? Why?

_____

_____

_____

_____

6. Do you have to read manuals and blueprints for the machines you work on? _____

a. Which are the easiest to work with? Why?

_____

_____

_____

b. Which are the most difficult? Why?

_____

_____

_____

c. Show me what makes them easy or difficult.

(get manual/equipment names for future analysis)

7. What other types of things are you required to read? (generated by?)

_____

_____

_____

_____

a. How does that relate to your doing your job?

_____

_____

_____

8. Do you have to do written documentation as part of your job? (report to next shift?) Explain.

_____

_____

_____

a. How easy/difficult is it for you to do?

_____

_____

_____

b. Do people often have questions about what you write? (Can people read your handwriting?)

_____

_____

c. What forms do you have to fill out? (payroll, insurance, OSHA, w/in dept.)

_____

_____

_____

9. What kinds of math skills do you use?

_____

_____

_____

a. In what context are they used? (i.e., compute work hours)

_____

b. How often do you use these skills?

_____

_____

_____

10. What special tools (i.e., hand tools, measuring devices) do you use in your job? (see grid)

11. When you run into a problem on a machine, what steps do you go through to analyze it and solve it?

_____

_____

_____

_____

_____

_____

* Identification of problem (how to determine seriousness or extent of damage?)
* First steps to resolve problem (reset)
* Research (manual, other people)
* Steps to resolve (analysis, documentation?)
* Solution (recommendations, documentation?)

EQUIPMENT USE ANALYSIS

Name of Tool	Use of Tool	How Often Do You Use It?	Special Skills Required	How Did You Learn to Use It?	Current Proficiency*

1 need to learn/learn more
2 still learning/not yet up to speed
3 adequate for the job
4 efficient
5 expert/could teach its use

a. What if the equipment needs major work/replacement?
   - Are written findings needed/verbal assessment?
   - What role do you play?

12. Suppose you had to teach me your job.
   a. What would I need to know?

   b. Would I need to know how to read/write/do math?

   c. What would you teach me first? Why?

   d. How could you judge if I had learned?

   e. What would I have to do to get fired?

13. What courses have been most helpful to you in the past? Why?

_____

_____

_____

13. What types of courses could Diemolding offer that would be the most helpful to you?

- review of foundational materials/opportunity to practice off the floor
- skills review
  - math
  - use of equipment/manuals
  - problem solving/troubleshooting
  - report writing
- GED

_____

_____

_____

a. What should be included in the course(s)?

_____

_____

_____

_____

14. What would you like Diemolding to know about training or courses that would help you do your job better?

Company:
Date of Interview:
Interviewer:

Supervisor
Name:

UAW-CHRYSLER REGION 9

TRAINING CENTER/OCM BOCES

WORKPLACE LITERACY SKILLS IMPROVEMENT PROJECT

Skills Upgrading Training

1. What are your job functions?

_____

_____

_____

2. What would Maintenance Department employees have to know to make YOUR job easier?

_____

_____

_____

3. What kinds of courses would be the most helpful to your Maintenance Department employees?

_____

_____

_____

"Technical Documentation" - (for work orders, etc.)
- suggested vocabulary for accuracy and consistency
- writing recommendations for repair/replacement
- for electrical/millwright/diesetting
- one-page handout

4. How could courses we might design be helpful?

_____

_____

_____

5. What are the Maintenance Department's strengths?

_____

_____

_____

6. What are the Maintenance Department's weaknesses?

_____

_____

_____

7. What areas of staffing need improvement?

_____

_____

_____

8. When you fill a vacancy, what skills and previous experience do you look for?

_____

_____

_____

9. Is it difficult top find qualified job applicants? Why?

_____

_____

_____

10. Where do you look for job applicants?

_____

_____

_____

11. What are the 3 most important things for Maintenance Department employees to know?

_____

_____

_____

_____

12. What makes their jobs more difficult?

_____

_____

_____

13. What makes a Maintenance Department employee an expert in his job?

_____

_____

_____

14. Is there anything else that I might need to know to be helpful in designing courses for the Maintenance Department's needs? Is there anything additional you'd like to say?

Federal Workplace

Skills Improvement

Program

UAW-CHRYSLER REGION 9 TRAINING CENTER/OCM BOCES

Table of Contents

1. 14 Steps for Developing Contextualized Curricula

2. Overview of Skills Enhancement Program

3. Summary Sheet - Diemolding Maintenance Department

4. Diemolding Corporation/Maintenance Dept.
   "Math for Maintenance"
   - -Course Overview
   - -Course Objectives
   - -Course Outline

5. Diemolding Corporation/Maintenance Dept.
   - -Course Overview
   - -Course Objectives
   - -Course Outline
   - -Sample Materials
     - -Work Order Revision
     - -Work Order Instructions

6. New Venture Gear/Machine Operators
   "Metric Conversion for Blueprint Reading"
   - -Cover page and 46 page curriculum
   - -Course Overview
   - -Course Objectives
   - -Course Outline

7. New Venture gear/Machine Operators
   "Math for SPC"
   - -Course Overview
   - -Course Objectives
   - -Course Outline

8. Crucible Specialty Metals/Bar Finish Dept.
   "Procedural Documentation"
   - -Course Overview
   - -Course Objectives
   - -Course Outline

9. Oberdorfer Industries/Green Sand Dept.
   "Math for Charting"
   - -Course Overview
   - -Course Objectives
   - -Course Outline
   - -Pre-test
   - -Sample Lesson and Agenda

10. Inland Fisher Guide/Machine Operators
"Math Mania for Machine Operators"
-Course Goals
-Pre-Test
-Overview and activities of seven sessions

11. New Process Gear/Skilled Trades
"Metric Immersion for Skilled Trades"
-Course Overview
-Course Objectives
-Course Outline
-Pre and Post Tests

*Also included is a report concerning the Curriculum Development.

UAW-CHRYSLER
REGION 9 TRAINING CENTER
6075 E. Molloy Road
Syracuse, New York 13211
(315) 463-7185

To: Workplace Literacy Dissemination Centers
From: Paula Hayes, Curriculum Developer
OCM BOCES/UAW-CHRYSLER Region 9 Training Center
Re: Curricula Products for the Federal Workplace Skills Improvement Project, May, 1991-Dec, 1992
Date: March 30, 1993

The attached curriculum outlines were developed for the Federal Workplace Skills Improvement Project as pilot courses for the following manufacturing based companies and their unions: New Process Gear, Diemolding Corporation, Oberdorfer Industries, Inland Fisher Guide, and Crucible Specialty Metals. The nature of our grant focused on designing courses and materials to meet the individual needs of these specific companies, their unions, and the workers. The materials that formed the basis of each curriculum were gathered from the participants' jobs in order to contextualize the course content and provide hands-on experiences that would be reinforced daily on the job. Since the majority of this information and the materials for these pilot courses is company-specific and confidential, we are not able at this time to provide the curricula in their entirety. However, we feel that the information gained from this pilot program is valuable information for other manufacturing based companies. Therefore we have provided the initial overviews and outlines that were constructed based on the job task analysis that was completed for each site. The success of these courses is due to the fact that each course focused on a direct relationship between the specific skill needs of the worker and the specific requirements of the workers'job.

Our plan during the next year is to spend additional time refining materials and methods from each of these pilot courses in order to develop curricula that would be more replicable in other settings. We have already been able to do this with the "Metric Conversion for Blueprint Reading" course that was developed during this project for the New Process Gear Service Pack Department. Since other companies in our consortium are currently interested in courses such as "SPC Math" and "Metric Immersion", we will soon be able to offer similar programs to these companies. From the experience of designing comparable courses, our project will then be better able to disseminate whole curricula such as the "Metric Conversion..." class that will be more useful to other projects. Later, we will be able to forward these products to your center.

If any further information is needed concerning this project and its products, please contact Paula Hayes at (315) 463-7185 or the Project Director, Jim Brower at (315) 451-6054.

The 14 Steps of Enlightenment

LiGHT

Learners Integrating their Goals with Higher Technology

Coordinated & prepared by:

Carol Turnbull

& Project Staff:

Paula Hayes
Margaret Hamstead
Gail Dyer
Blanche Swaim

Jim Brower: Assistant Director Adult Education

UAW-CHRYSLER
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Syracuse, New York 13211
(315) 463-7185

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Tel. (315) 451-6054

The 14 Steps to Enlightenment

Light

Learners Integrating their Goals with Higher Technology

1. Initial Meetings

Partners

- Include BOCES workplace literacy (WPL) staff, company union and management.
- Discuss terms of grant.
- Define roles and responsibilities.
- Begin defining training needs: assess current needs, changing technology and company direction.
- Determine funding for training.

2. Tour of Plant

Partners

- Present overview of operation (company).
- Take walk-through of operations at plant.
- Conclude tour with time for questions and answers.

3. Project Definition

Company

- Target a group for training.
- Appoint project team and meet to define project.
- Develop visible support from upper levels of union and management.
- Inform workers and promote project among them.
- Select a sampling of workers to be interviewed (minimum: 25% of targeted group).
- Determine interview (task analysis) site and dates.
- Discuss pre/post assessment: tools, times and dates.

OCM BOCES/UAW-CHRYSLER
REGION 9 TRAINING CENTER

4. Materials

Company

- Collect job-specific documents, such as safety instructions, job descriptions, operating procedures, manuals, memos, and payroll envelopes.
- Collect relevant general documents, such as employee handbooks.
- Give materials to task analyst.

5. Task Analysis

WPL Team

- Prepare forms to be used for interviewing workers and supervisors.
- Conduct confidential on-site interviews with workers selected from targeted group.
- Interview supervisor(s).
- Meet with other relevant personnel, such as quality assurance.
- Collect additional materials that are relevant to training (gauges, scales, blueprints, parts, e.g).

6. Task Analysis Report

WPL Team

- Draft confidential report for curriculum development and project administration.
- Make follow-up contacts as necessary to complete research.
- Write final draft, including training recommendations.
- Give report and company materials to project administrator.

7. Recommendation Meetings

Partners

- Present training recommendations from task analysis (WPL team).
- Present proposed curriculum based on task analysis, company goals, and team discussions (WPL team).
- Discuss and refine curriculum goals as necessary.

8. Curriculum Definition

WPL Team

- Revise curriculum.
- Get "sign-off" from project team.

9. Development of Curriculum

WPL Team

- Define goals and supporting objectives.
- Integrate materials and equipment that are job-specific.
- Include basic skills: learning to learn, 3 R's, communication, problem-solving and decision-making, teamwork, use of calculators, strategies for remembering.
- Write final draft of curriculum.
- Estimate number of hours required for training.
- Arrange for training staff.

10. Class Scheduling

Company

- Organize workers into classes of no more than 10.
- Determine location and time of classes.
- Inform workers and management of class schedules.
- Decide if other workers will be invited to attend "on their own time."

11. Project Pre-Assessment

WPL Staff

- Work with company to decide on place, times and dates.
- Make sure workers are informed.
- Administer assessment follow-up as required by project evaluators.

12. Classes

WPL Team

- Introduce educational staff.
- Administer job-specific pre-training assessment.
- Conduct training and monitor learning.
- Administer job-specific post-training assessment.
- Administer project post-assessment as required by project evaluators.

13. Graduation

WPL Team

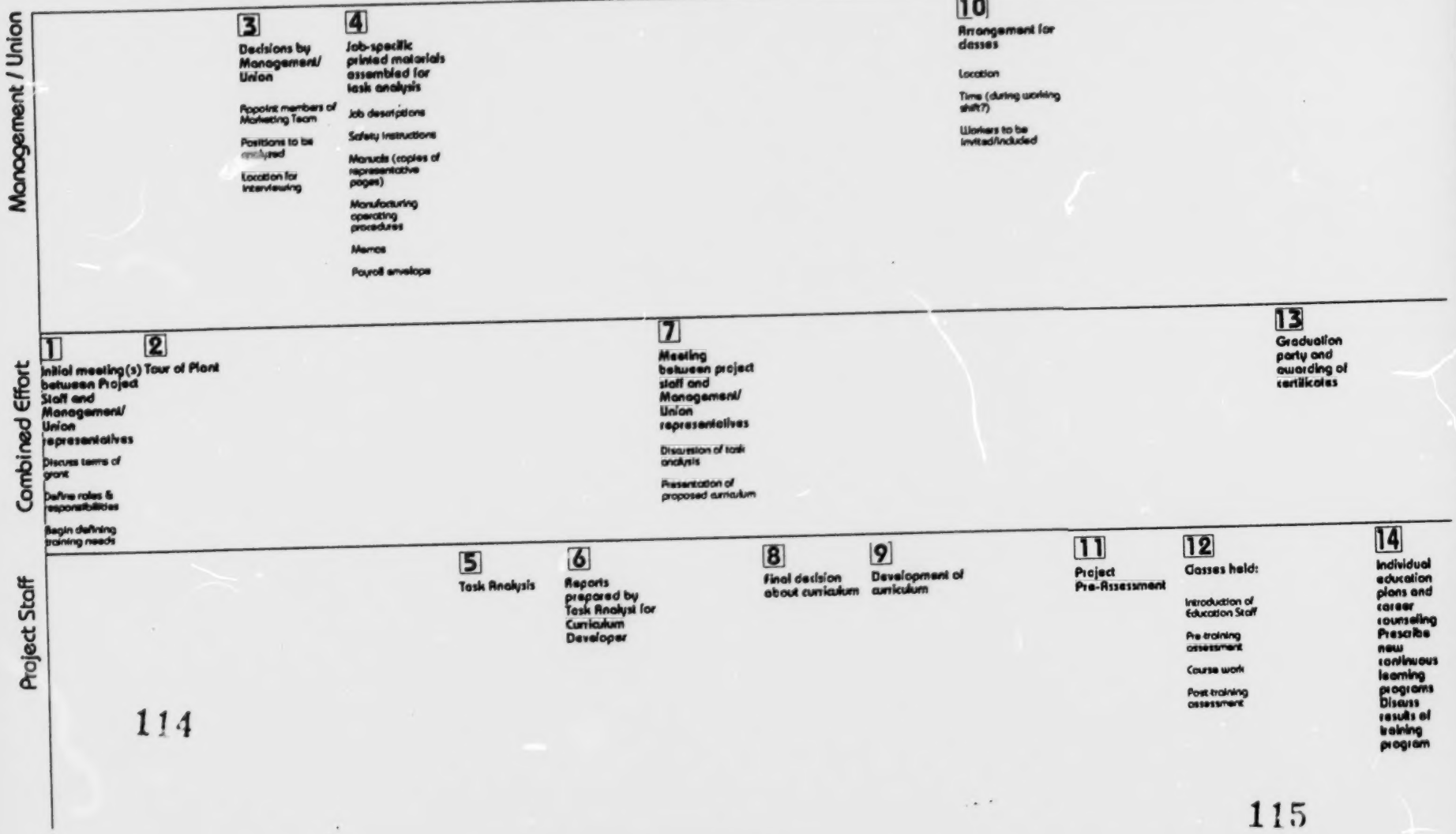
- Organize ceremony.
- Print certificates and arrange for awards.
- Hold celebration.

14. Follow-Up

Partners

- Counsel students, develop educational plans, and prescribe new/continuous learning programs.
- Discuss results of training program.
- Celebrate!

Figure 4: The 14 steps of Enlightenment (LIGHT - Learners Integrating their Goals with Higher Technology



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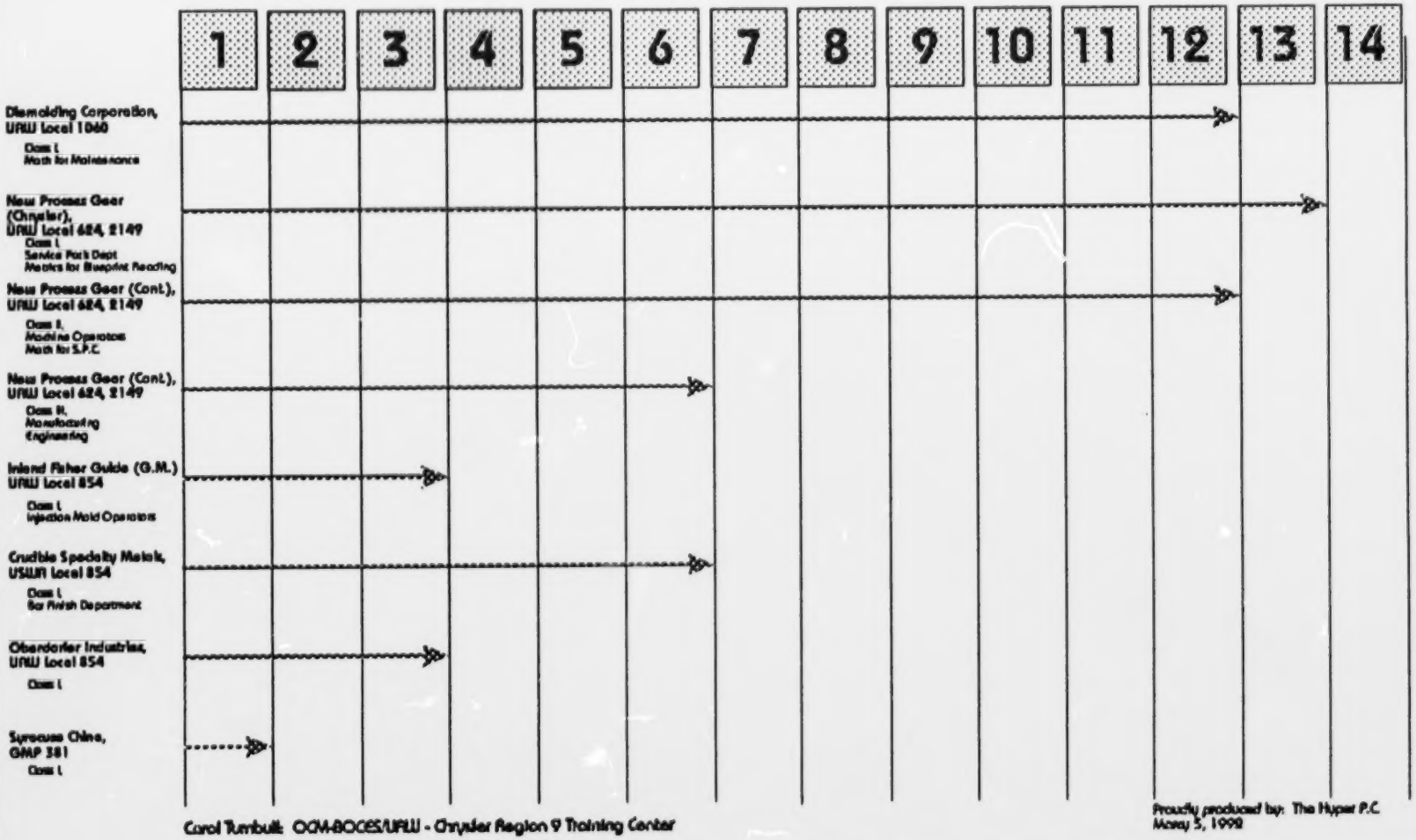
Workplace Literacy Skills Improvement Project
Timeline



Carol Turnbull: OCM-BOCES/UAW - Chrysler Region 9 Training Center

Proudly produced by: The Hyper P.C.
May 5, 1992

Curriculum Developer: Paula Hayes
UAW-CHRYSLER REGION 9 Training Center/OCM BOCES

"Skills Enhancement Program"

The following goals and objectives are excerpted from the text Individualizing Instruction by Roger Hiemstra and Burton Sisco which focuses on the facilitative model of adult education. This model views the instructor as someone who will provide the environment, materials, and guidance that is needed in order for the student to be a successful learner. We feel that these goals express the intent of our program.

Within the framework of this facilitative model, the instructor would:

1. "... serve as content resource for learners."

2. "...take responsibility for managing a process of assessing learner needs."

3. "... arrange and employ the resources necessary for your learners to accomplish their personal goals."

4. "...use a wide variety of instructional techniques and devices to maintain learner interest or to present certain types of information."

5. "...be aware of techniques for stimulating and motivating learners so that all can reach their potential."

6. "...help your learners develop positive learning attitudes and positive feelings about their ability to be independent."

7. "...determine whether learners are reflecting on what they have learned."

8. "...evaluate learner achievements in various ways, ranging from more traditional testing and critiquing of written materials to less traditional techniques such as personal interviews with learners."

Hiemstra, R. & Sisco, B. (1990). Individualizing Instruction:Making Learning Personal, Empowering, and Successful (pp. 15-18). San Francisco: Jossey-Bass.

These overall curriculum goals would serve as a basis for classroom curriculum, strategies, and materials. Students would have an influence on the curriculum on a class to class basis. Content and strategies would be reassessed in order to try to meet the students learning goals. The atmosphere would focus on maintaining curriculum flexibility so that each participant could experience a supportive learning environment.

SUMMARY SHEET	COMPANY:	JOB:	DATE:
BASIC SKILLS	READING/WRITING/MATERIALS	TOOLS	MACHINERY
READING			
WRITING			
MATH			
COMMUNICATION			
PROBLEM SOLVING			

SUMMARY SHEET | COMPANY: DIEMOLDING | JOB: MAINTENANCE | DATE: AUGUST 13, 1991

BASIC SKILLS

READING

- time cards
- work from elec. prints
- understand problem w/ work order
- reading manuals, drawings, schematics
- manuals (installation & instruction)
- set up sheets/new equipment

WRITING

- document work performed/or recommended on work orders
- document service performed (sprinkler systems, boilers
- recordkeeping

MATH

- translate test equipment readings
- estimate repair jobs
- use "shop" math
- measuring/formulas
- calculating rate of flow, pressure, temperature relations

COMMUNICATION

- interface w/other
- shifts and personnel
- making work assignments
- talk with operators, etc. to discuss equipment problems

PROBLEM SOLVING

- analyze problems accurately
- solving equipment/ machine problems

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READING/WRITING MATERIALS

1. Work orders
2. Manuals
3. Set up sheets
4. Power tube forms (electrical comp.)
5. Memos/safety issues vacations
6. Safety signs (warnings)
7. Time Cards

TOOLS

1. Micrometers
2. Amp meter
3. Continuity tester
4. Multimeter
5. Hi-pot (hi-potential elect. meas. device)
6. Amp clamp
7. Pressure gauges
8. Scales
9. Vernier calipers
10. Rules

Miscellaneous Hand Tools

1. Specialized wrenches
2. Air wrench
3. Ratchets
4. Open-ended wrenches
5. Pipe wrenches
6. Grinders

MACHINERY

1. Radio frequency ovens (RF ovens)
2. Press control boxes
3. Plant electrical system (National electrical code/ knowledge of Industri electricity)
4. Molding machine
5. Perform machine
6. Pumps, boilers
7. Compressors
8. Motors
9. Wheelabrators
10. Tappers
11. Drill presses
12. Mold presses

Paula Hayes/BOCES
UAW/Chrysler Training Center

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WORKPLACE SKILLS IMPROVEMENT PROJECT

COURSE: _____ COMPANY _____

SITE: _____ DATE _____

SESSION TOPIC: _____

OVERALL GOAL(s): _____

_____

OBJECTIVES	ACTIVITIES	TECHNIQUES/s METHOD/s	MATERIALS	TIME

EVALUATION OF SESSION

_____

_____

_____

FOLLOW-UP FOR NEXT SESSION

_____

Diemolding Corporation
Curriculum Developer: Paula Hayes
BOCES/UAW- CHRYSLER TRAINING CENTER - Region 9
August 28, 1991

"Math for Maintenance"

Course Overview: Based on the job task analysis findings, the course "Math" for Maintenance" is being recommended for Diemolding Corporation. Both supervisors and floor personnel stated the necessity for a course that included instruction in the accurate use of measuring devices, the ability to translate test equipment readings calculations of rate of flow, pressure, and temperature relations. Curriculum would be flexible and instructors would employ many varied techniques ranging from group instuction to individualized activities. Every effort would be made to provide successful learning experiences for participants. It is anticipated that workers would be able to directly transfer their newly acquired skills to their specific job tasks.

Course Objectives:

Participants will be able to:

1. ... demonstrate proficiency with basic math functions for fractions.

2. ... demonstrate proficiency with basic math functions for decimals.

3. ... demonstrate their ability to measure precisely with a machinist's rule, micrometer, caliper, and other measuring devices and accurately record the number to the nearest thousandth.

4. ... show their ability to compute mean, median, and range using a calculator based on SPC training components.

Outline for Diemolding Corporation
Curriculum Developer: Paula Hayes
BOCES/UAW/ - CHRYSLER TRAINING CENTER
Revised-March 1, 1992

"Math for Maintenance"

I. Course Overview and Introductions

- A. Goals and Philosophy
  - 1. The role of the instructor as a facilitator
  - 2. Group instruction vs. Individualization
- B. Introductions - Small group exercise

II. Pre-assessment Inventories

- A. Fractions
- B. Decimals
- c. Measuring Devices applicable to Industry

III. Reading Measuring Devices Accurately

- A. Fractions
- B. Decimals (to the nearest thousandth)

IV. Proper use of Measuring Devices

- A. Rules
- B. Calipers
  - 1. Vernier
  - 2. Dial
- C. Micrometers
- D. Multimeter
- E. Other measuring devices (refer to chart)

V. Math Functions Applicable to Industry

- A. SPC Training - Basic Math Funcntions
  - 1. Mean
  - 2. Median
  - 3. Range
  - 4. Using a calculator
- B. Making calculations and taking readings
  - 1. Rate of flow
  - 2. Pressure
  - 3. Temperature relations
- C. Estimating job repairs
- D. Using formulas

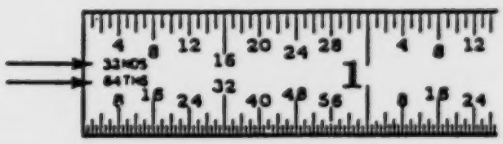
VI. Metric Conversions

BOCES/UAW-CHRYSLER REGION 9 TRAINING CENTER
DIEMOLDING CORPORATION
Curriculum Developer: Paula Hayes

"Math for Maintenance"
Pre-assessment / Post assessment Scales #1
March 10 & 12, 1992

Directions: **Record the following readings in the spaces provided in decimals.**

1. On a *machinist's pocket rule*, an inch is usually divided into both 32 and 64 units.

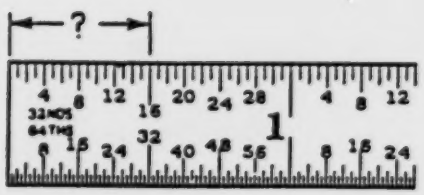


a. How large is each unit on the *32nds* scale? _____

b. How large is each unit on the *64ths* scale? _____

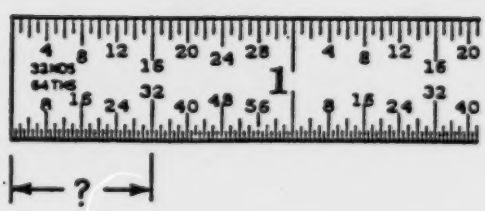
2. a. How many units are there in $\frac{1}{2}$" on the *32nds* scale? _____

b. Write this as a fraction. _____



3. a. How many units are there in $\frac{1}{2}$" on the *64ths* scale? _____

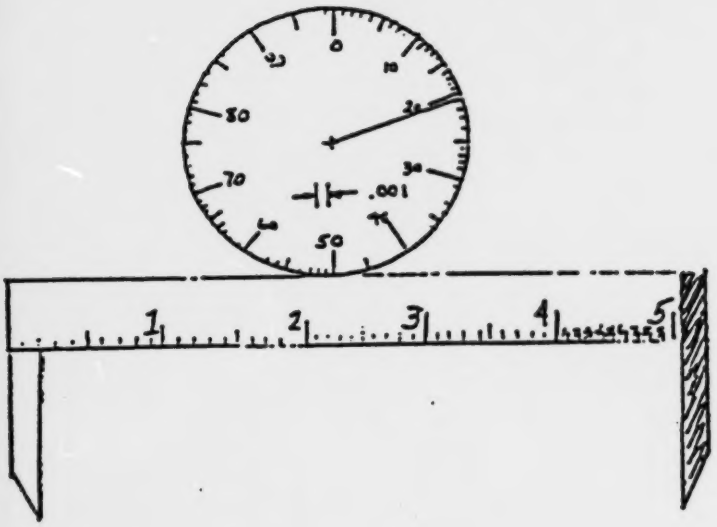
b. Write this as a fraction. _____



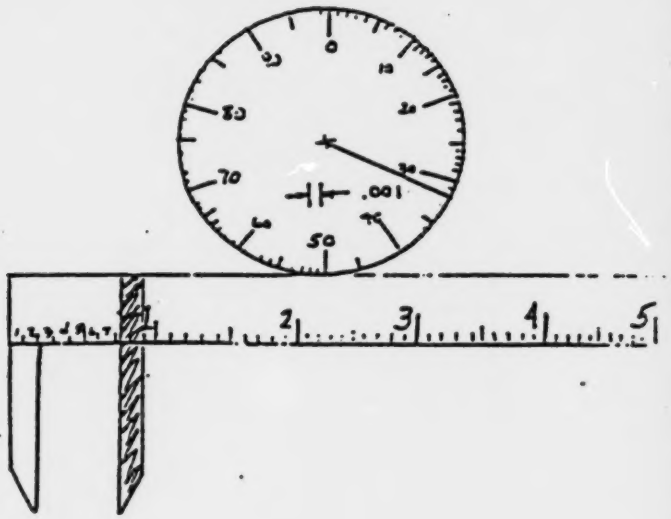
BOCES/UAW-CHRYSLER REGION 9 TRAINING CENTER
DIEMOLDING CORPORATION
Curriculum Developer: Paula Hayes

"Math for Maintenance"
Pre-assesment #2A Dial Calipers
March 10 & 12, 1992

Directions: **Record the following readings in the spaces provided in decimals.**



1. _____



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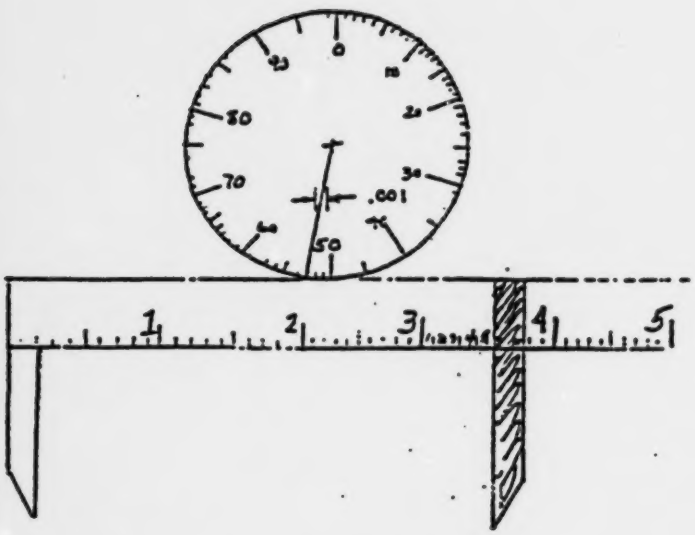

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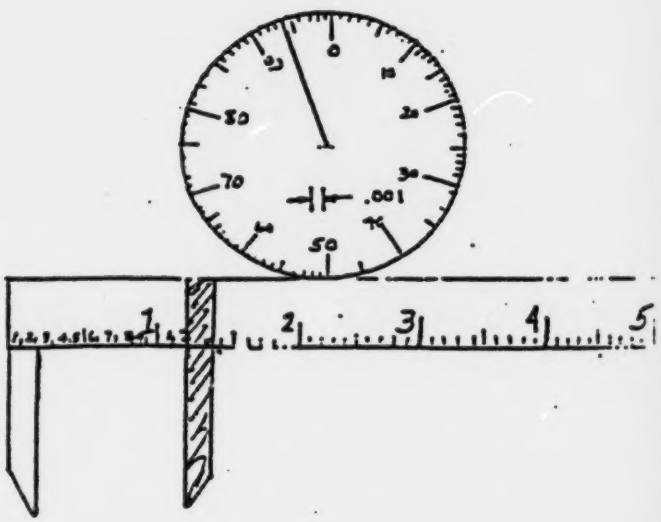


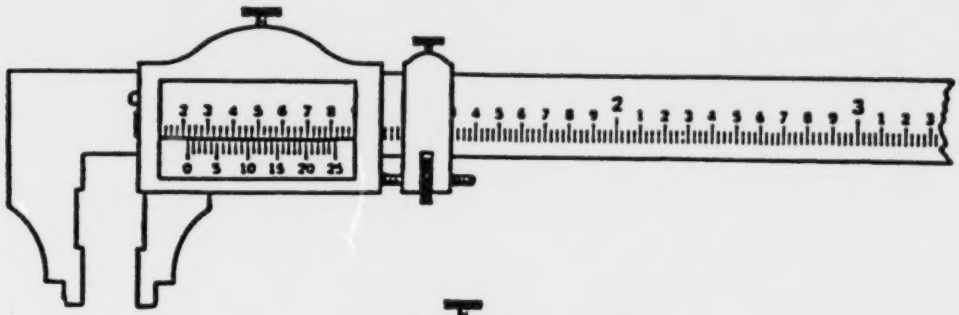
4. _____

BOCES/UAW-CHRYSLER REGION 9 TRAINING CENTER
DIEMOLDING CORPORATION
Curriculum Developer: Paula Hayes

"Math for Maintenance"
Pre-assessment #2B Calipers (vernier) #2B
March 10 & 12, 1992

Directions: Record the following readings in the spaces provided in decimals.

1 _____



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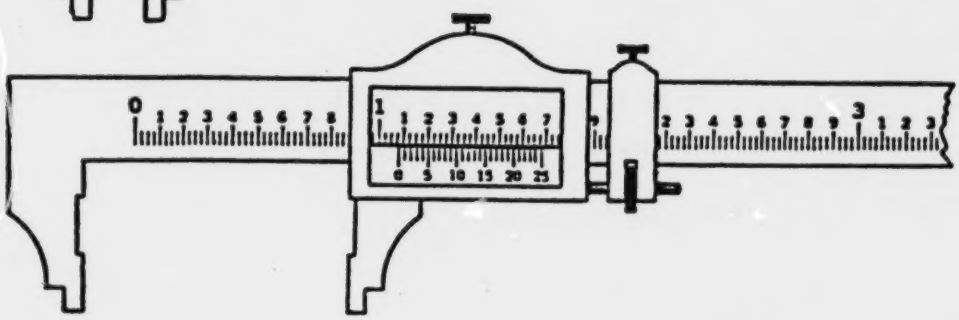

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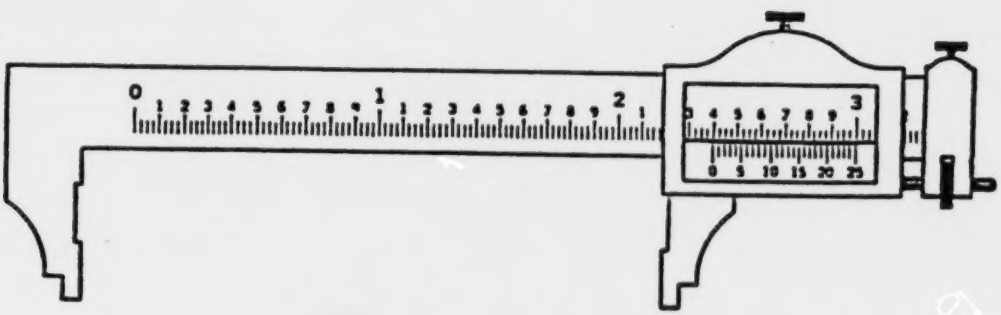

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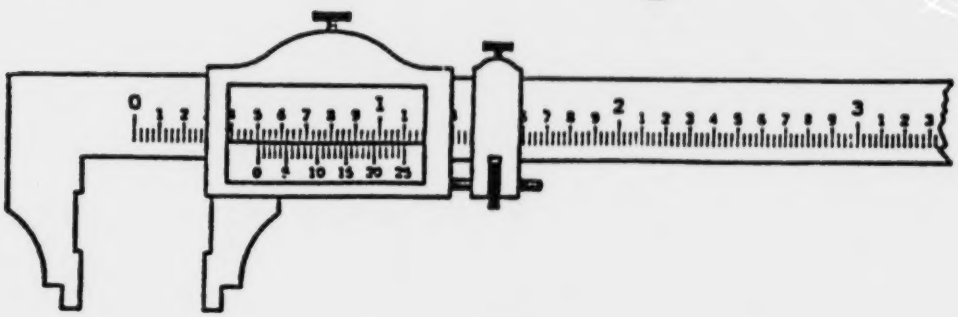

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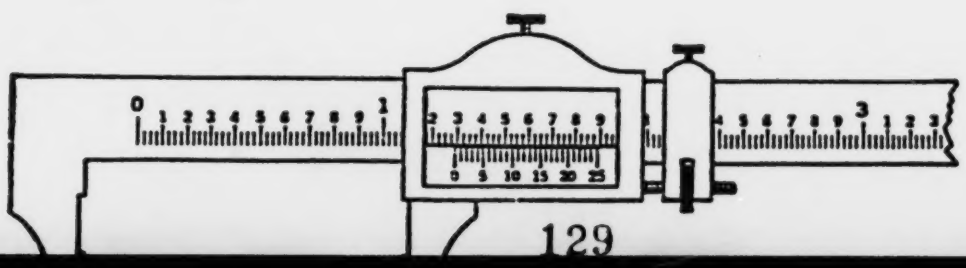
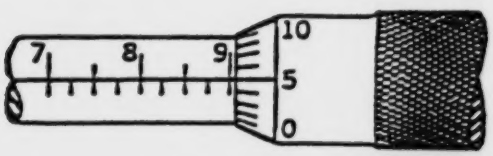
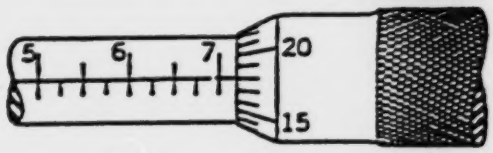


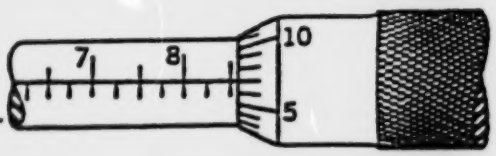
BOCES/UAW-CHRYSLER REGION 9 TRAINING CENTER
DIEMOLDING CORPORATION
Curriculum Developer: Paula Hayes

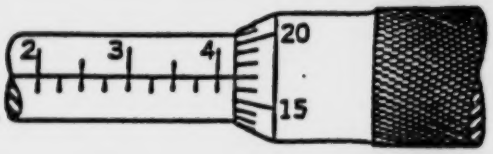
"Math for Maintenance"
Pre-assessment #3 Micrometers
March 10 & 12, 1992

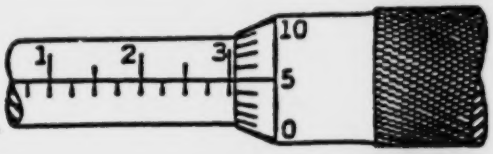
Directions: **Record the following readings in the spaces provided in decimals.**

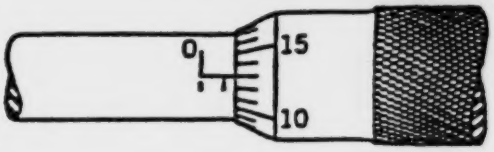
1. _____ 

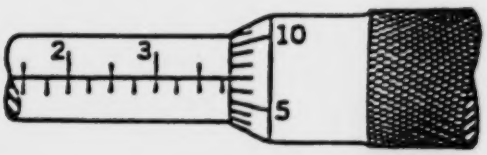
2. _____ 

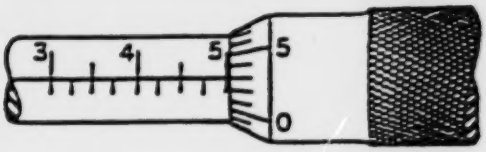
3. _____ 

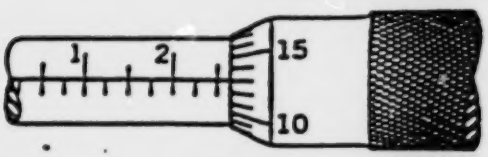
4. _____ 

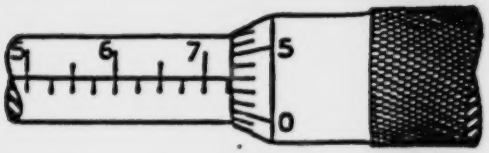
5. _____ 

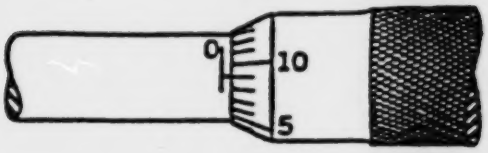
6. _____ 

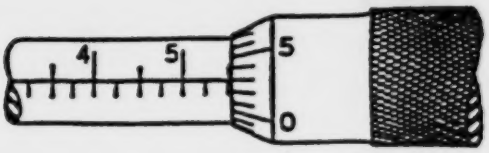
7. _____ 

8. _____ 

9. _____ 

10. _____ 

11. _____ 

12. _____ 

Proposed Course for Diemolding Corporation (5 weeks)
Curriculum Developer: Paula Hayes
BOCES/UAW-CHRYSLER TRAINING CENTER-Region 9
August 28, 1991

"Technical Documentation"

Course Overview: The job task analysis findings also indicate a need for a second course entitled "Technical Documentation." The outcomes of the analysis show that workers need to improve their written communication skills in the areas of technical vocabulary, completion of work orders, documentation of services performed, and improvement in the quality of the paperwork. The overall goal of this course is to help workers improve their writing skills in order to facilitate better workplace communication and increased job task productivity.

Course Objectives:

Participants in this course will be able to:

1. ...define and use technical vocabulary on work orders.

2. ...accurately summarize services performed on work orders.

3. ...demonstrate improved quality of paperwork in the areas of spelling, handwriting, and the correct use of technical vocabulary.

4. ...demonstrate knowledge of plant materials, tools, and machinery as it relates to work order documentation.

Proposed Course Outline (5 weeks)
Curriculum Developer: Paula Hayes
BOCES/UAW-CHYRSLER TRAINING CENTER
August 28, 1991

"Technical Documentation"

I. Technical Vocabulary

A. Materials
   1. SPC Training Manual
   2. Work Orders/Job Specific Terminology
   3. Manuals
   4. Set-up Sheets
   5. Parts/Stock orders
   6. Memos/Safety signs
B. Tools
   1. Measuring Devices
   2. Other Specialized Tools
C. Machinery

II. Initiation and Completion of Work Orders

A. Standard Work Order Procedures
B. Documentation of Work Performed/Recommended on Work Orders
   1. Preventative Maintenance
   2. Repair Service
   3. Redesign of Machines
C. Documentation of Service Performed
   1. Sprinkler System
   2. Boilers

III. Improvement in the Quality of Paperwork

A. Correct Use of Technical Vocabulary
B. Accuracy in Logging Information in Designated Area on Forms
C. Clarity of Expression (paraphrasing)
D. Spelling Skills for Technical Terminology
E. Cursive Handwriting Practice

MEMO

TO: Mr. Jack McKenzie
FROM: Paula Hayes, BOCES Instructor
RE: Draft of revised Maint. work order form
DATE: June 11, 1992

The Maintenance Dept. would like to propose a revision of the current work order. The group shared ideas during the last three weeks in the course "Technical Documentation" and came to a consensus regarding the specifics of the revision. Also, as you suggested, we wrote an instruction sheet that can be used to train personnel who will be involved in using this work order. These last few weeks were very productive and allowed the maintenance dept. to feel directly involved in the decision making process.

We feel that these changes would help to improve communication throughout the plant and in the long run save both time and money. We would appreciate any feedback as soon as possible regarding this matter as well as any information about training for supervisory personnel.

Thank You.

Original
Demolding Form

MAINT. WORK ORDER

AREA -PULLEYS
MOLD
PREFORM
TECH. PRODUCTS
VALVE BODY
SHIPPING
FINISH
REACTOR
BUILDING
Q.C.

PROBLEM -MECHANICAL
ELECTRICAL
DIE CHANGE
HYDRAULIC
PNEUMATIC
OTHER - _____

What equipt., work to be done on.- _____
_____
DATE: _____
DEPT.: _____
Work requested by whom. _____

What work to be done. _____
_____
_____
_____

Work assigned to _____
Corrective Action-
What was done _____
_____

Hrs. worked on this job. _____
Materials used on this job. _____

WO. # _____ HOUR METER READING : _____

"Technical Documentation"
Diemolding Corporation
Paula Hayes-Curriculum Developer, Federal Project
UAW-CHRYSLER Tr.Ctr./BOCES

June 11, 1992

Instructions for Completing Revised Maintenance Work Order

1. Top portion for supervisors. PRINTING ONLY to be used on entire form.

2. Area (of problem): Check the appropriate area where the problem is located. These areas may change as new cells are implemented.

3. Problem: Based on your observation of the problem, check the appropriate area of difficulty. If unsure, check other.

4. Explain problem: Explain, to the best of your ability, what operation or function of the machine or equipment is not operating properly.

5. Date: Record the date when the work order is written or requested.

6. Work requested: Record the name of the person who is requesting the work order.

7. Equipment to be repaired: Record the proper equipment name, and/or equipment number, and include the location of the equipment whenever possible.

8. Work assigned to: This is the person who is notified or assigned to assess + diagnose the problem. (This person will most likely not be the repairs)

**********For Maintenance Personnel Only**********

9. Work performed (problem and solution): Maintenance personnel will record the actual problem and the action that was taken to solve the problem or repair the equipment.

10. Materials used on this job(*out of stock):

-List all materials by #(number) and/or description.

-List the quantity or amount used.

-Designate (*) materials that are out of stock and need to be reordered.

11. Hours Date Initials

Each person who worked on a particular job (or work order) will record the time spent, the date, and his initials. This will allow for several people to keep track of their time when working on a large job or an on-going preventative maintenance job.

12. Comments: Record any additional pertinent information.

13. Work Order #: This is the # that is assigned by the maintenance supervisor and corresponds to a computer number.

14. Counter Reading: Record the reading if a machine has a counter. This will provide information to track part longevity and improve P.M. procedures.

15. Hour Meter Reading: Record the hour meter reading on the R.F. oven or other equipment.

Revised work order.

MAINTENANCE WORK ORDER

To be filled out by supervisory personnel: (PRINTING ONLY)

Area (of problem)
___Thrust washer
___Pulleys
___Mold
___Preform
___Tech.Products
___Valve Body
___Shipping
___Finish
___Reactor Cell
___Building
___Q.C.

Problem
___Mechanical
___Electrical
___Die Change
___Other: _____

DATE: _____
Work requested by: _____
Equipment to be repaired: (include #, Ex.press #, etc.) _____

Explain problem: _____

WORK ASSIGNED TO: _____

Do Not Write Below This Line (Maint.personnel only)

****

Work Performed (problem & solution): _____

Materials used on this job (*out of stocK): _____

Hours	Date	Initials
____	____	____
____	____	____
____	____	____
____	____	____

Comments: _____

Work order #: _____ Counter reading: _____
Hr.Meter reading: _____

CURRICULUM COVER PAGE

COURSE TITLE: "Metric Conversion For Blueprint Reading"

DEVELOPERS: Paula Hayes with technical assistance from:
Carol Turnbull- basic skills
Fred Gonroff-blueprint reading skills
Bob Cameron-part-specific expertise

AGENCY/UNION: Syracuse Union/Management Consortium/OCM BOCES

ADDRESS: 6075 East Molloy Rd. Syracuse New York 13211 **PHONE:** 463-7185

DATE OF PUBLICATION: August, 1992 **TOTAL PAGES:** 46

TARGET AUDIENCE: GED Level **READABILITY LEVEL:** 8-9th grade level.

BACKGROUND KNOWLEDGE REQUIRED: Basic math (addition,subtraction,place value), Knowledge of automotive parts, and some basic blueprint knowledge would be helpful.

COURSE DESCRIPTION: This course is intended to introduce techniques for making conversions from millimeters to inches. This course was designed to be job specific in order to help students identify automotive parts accurately from CAD prints (Computer Aided Drafting). For additional information, see the Course Description, outline, objectives, and Pre/Post Survey results.

SUBJECT AREAS COVERED: Math; Blueprint Reading; Calculator Skills; Reading; Communication, Decision Making, and Trouble-shooting Skills.

HOURS OF INSTRUCTION: 18-25 hours

STUDENT OUTCOME OBJECTIVES:

Participants will be able to:

1. Use a metric conversion chart or calculator to convert millmeters to inches with 100% accuracy.
2. Read part identifiers on all parts/prints used in the course with 100% accuracy.
3. To count the number of teeth on each part and use the print to determine this number with 100% accuracy.
4. Locate the splines on the prints used in class with 100% accuracy.
5. Read the print in order to determine what needs to be ground on a part with 100% accuracy.

Curriculum Cover Page 2

MODE OF INSTRUCTION: Team teaching, individualized and small group discussion, hands-on practice, oral/visual presentations.

MATERIALS INCLUDED: Course overview and outline, Lesson objectives and sample agendas, exercises and activities, Bibliography for supplemental materials.

RELATED/SUPPLEMENTARY MATERIALS NEEDED: Contemporary's Number Power 2 and Calculator Power; Pouler's Print Reading For The Machine Trades; calculators; metric rulers; metric conversion charts; overhead projector for diagrams; and automotive parts and CAD prints.

JOB SPECIFIC OR GENERIC:

EVALUATION: Pre/Post Test
Review exercises

COMMENTS: This curriculum was developed for the Service Pack Department of New Venture Gear, Inc. in East Syracuse, New York. This course used actual parts and CAD prints from the plant for a hands-on learning experience. Since the program was individualized, small group, and team-taught with four instructors (max- ten students per class) we had ample daily feedback from all participants and supervisors. Two students in our class were non-readers and one student was ESL. Tutoring for each of these students was provided on a per class basis. This course could be adapted by using other automotive parts and prints. Blueprints and CAD drawings could not be provided because this is confidential information.

Service Pack Dept.- New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER REGION 9 TRAINING CENTER/BOCES

"Metric Conversion for Blueprint Reading"

Course Description: Based on the job task analysis findings, the course "Metric Conversion for Blueprint Reading" is being offered to the Service Pack Department at New Venture Gear. Supervisors and floor personnel expressed a specific need for workers to be able to read blueprints and convert dimensions (in metrics) from CAD drawings to actual size. The goal of this training is to improve participants' ability to accurately identify parts on the job. Specific parts and blueprints from the Service Pack Department will form the basis of the curriculum for this course. Workers will have ample opportunity to refine their skills in a hands-on learning experience. It is anticipated that this course will consist of several hours (16-20) of job specific training.

Overall Goal: To improve workers' ability to accurately identify parts on the job.

Objectives: Participants will be able to:

1. Use a metric conversion chart to convert millimeters to inches with 100% accuracy (a calculator may be used).

2. Read part identifiers on all parts/prints used in the course with 100% accuracy.

3. To count the number of teeth on each part and use the print to determine this number with 100% accuracy.

4. Locate the splines on the prints used in class with 100% accuracy.

5. Read the print in order to determine what needs to be ground on a part with 100% accuracy.

Service Pack Dept.- New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER Region 9 Training Center/BOCES

"Metric Conversion for Blueprint Reading"

I. Pre-Survey

II. Metric Measurements

- A. The metric system
- B. How to use the conversion chart
  1. Calculator use
  2. Millimeter-inch relationship

III. General Blueprint terminology

- A. All terms on blueprint specific to Service Pack
  1. Finishes (micro) inch/metric
  2. Spur vs. helical gears and splines
- B. Note what is not specific to Dept. needs

IV. Part Specific information

- A. How to read part identifiers
  1. Groove locations
  2. Amount of grooves
- B. How to tell exactly what should be ground on part
- C. How to tell the number of teeth a part has
- D. How to locate the spline on the print

V. Post Survey

BEST COPY AVAILABLE

Service Park Dept.- New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER REGION 9 Training Center/OCM BOCES

"Skills Enhancement Program"

The following goals and objectives are excerpted from the text Individualizing Instruction by Roger Hiemstra and Burton Sisco which focuses on the facilitative model of adult education. This model views the instructor as someone who will provide the environment, materials, and guidance that is needed in order for the student to be a successful learner. We feel that these goals express the intent of our program.

Within the framework of this facilitative model, the instructor would:

1. "... serve as content resource for learners."

2. "...take responsibility for managing a process of assessing learner needs."

3. "... arrange and employ the resources necessary for your learners to accomplish their personal goals."

4. "...use a wide variety of instructional techniques and devices to maintain learner interest or to present certain types of information."

5. "...be aware of techniques for stimulating and motivating learners so that all can reach their potential."

6. "...help your learners develop positive learning attitudes and positive feelings about their ability to be independent."

7. "...determine whether learners are reflecting on what they have learned."

8. "...evaluate learner achievements in various ways, ranging from more traditional testing and critiquing of written materials to less traditional techniques such as personal interviews with learners."

Hiemstra, R. & Sisco, B. (1990). Individualizing Instruction:Making Learning Personal, Empowering, and Successful (pp. 15-18). San Francisco: Jossey-Bass.

These overall curriculum goals would serve as a basis for classroom curriculum, strategies, and materials. Students would have an influence on the curriculum on a class to class basis. Content and strategies would be reassessed in order to try to meet the students learning goals. The atmosphere would focus on maintaining curriculum flexibility so that each participant could experience a successful learning experience.

"Metric Conversion For Blueprint Reading"

Class #1

Objectives: Students will be able to:

1) ...Complete the pre-assessment in the time allotted using the prints, parts, and calculator provided.

2) ...complete the handout and word search on Blueprint Reading with 85% accuracy.

Activities:

1. Welcome and Introductions
   Program Background
   Individualized Approach
   Registration Form

2. Ice-Breaker Activity

3. Rationale and Directions
   Pre/Post Survey

Break

4. Blueprint Terminology- Chapter 5
   Word search and Fill-in exercise

Service Pack Dept. - New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER REGION 9 TRAINING CENTER/ OCM BOCES

"Metric Conversion for Blueprint Reading"

Pre and Post Survey

Directions: Following is a survey of information that may be used in the Service Pack Department at New Venture Gear. This survey is being given in order to determine the course content from the workers' perspective and assess the needs of the participants. In addition, the information from this survey will help to determine the success of the course content. This same survey will be given again at the completion of the course.

Please use the numbered parts, the CAD drawings, and the calculator to complete these ten questions. It would be most useful for our curriculum development if you did not guess on this questionaire or discuss the questions with other participants. All information is confidential and ungraded.

1. What is 1mm equal to in inches?_____

2. Using the calculator, convert 168mm to inches._____

3. Compare Part #_____ and part #_____. What is the difference between these two parts?

4. Using the high limit for calculations, what is the major diameter of Gear #_____ in inches? _____

   Gear #_____ in inches? _____

5. What is the overall thickness in inches of these two parts?
   _____

6. Indicate the symbol that is used to represent a ground surface._____

7. On part #_____, how many surfaces are ground?
   _____

8. What's the difference between part #_____ and part #_____?
   _____

9. Is part #_____ a helical or spur gear?
   _____

10. Refer to part #_____.
    How many splines are there?_____

    How many serrations are there? _____

Service Pack Dept.- New Venture Gear Name:_____
Curriculum Developer: Paula Hayes
UAW-CHRYSLER REGION 9 TRAINING CENTER/ OCM BOCES

Word
Search : "Metric Conversion For Blueprint Reading"

Directions: Fill in the blank spaces at the bottom of the page to find the correct term that is used for different types of lines in blueprints and CAD drawings. Then search for the word in the puzzle below and circle it. There are seven total answers. For extended practice, try indentifying these different types of lines with CAD drawings at work (as time allows).

t r e s d a b s z o k a

k v i s i b l e q e t d

r i e o f h e c t a e q

o u t c r e p t i r o u

e d i m e n s i o n y e

z k c a m r e o h t c i

c o h i d d e n e b e d

d y p e s d x i c s s o

u t c e a e t w s l u r

s v e n r c e n t e r p

s h a n i k n s i a c l

t z o n a r s a u d p a

e c h n u e i m t e e n

r m e d o t o c a r a t

v f w a z e n a r v d o

1. Short dashes of medium weight_____.
2. Thin broken lines of long and short dashes_____.
3. These lines end with arrowheads. They help to locate a particular _____.
4. Thick continuous lines _____.

5. Continuations of the object line_____.

6. Thin, continuous and closely spaced lines_____.

7. These lines are drawn at an angle and are used to point to notes that describe a particular feature._____

"Metric Conversion For Blueprint Reading"

Class #2

Objectives: Students will be able to:

1) ...complete Exercise #1-"Identifying Lines on Prints" with 75% accuracy using the handouts, prints, and books provided.

2) ...complete Exercise #2-"Converting mm to inches on Blueprints" with at least 50% accuracy.

Activities:

1. Complete and go over Word Search.

2. Group results of Pre-Survey.

3. Exercise #1-"Identifying Lines on Prints"

4. Introduce Calculators-Calculator Information Sheet
   Four Basic Functions
   Fractions/Decimals
   Reading Decimals

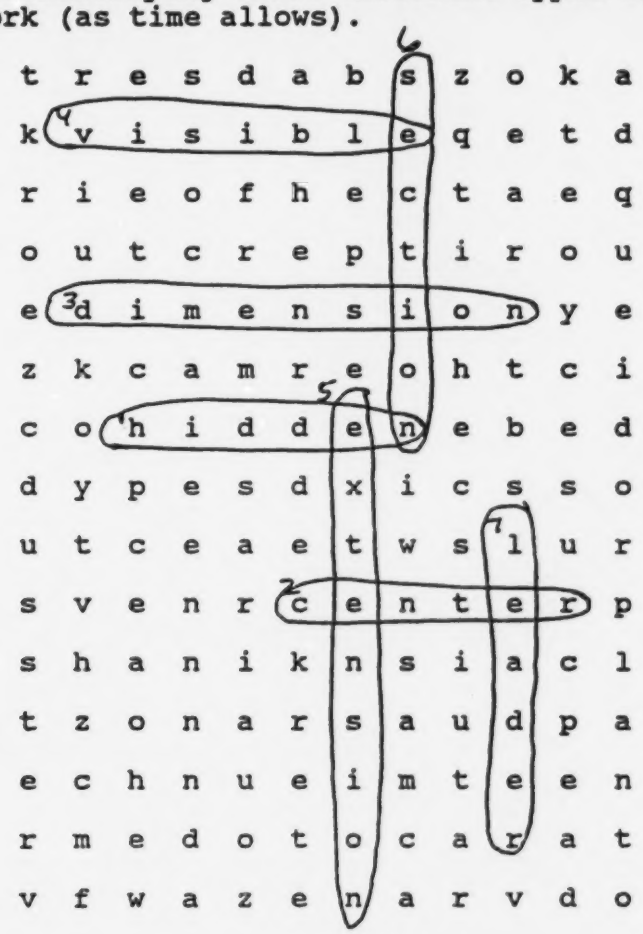
Break

5. Exercise #2-"Converting mm to in. on Blueprints"
   Introduction of metric conversion figure-1 in.= 25.4mm
   Using the calculator to convert mm to inches/Procedure and practice
   Group exercise- Hands-on.

Service Pack Dept. - New Venture Gear Name:_____
Curriculum Developer-Paula Hayes
UAW-CHRYSLER TRAINING CENTER/ OCM BOCES

Word
Search : "Metric Conversion For Blueprint Reading" KEY

Directions: Fill in the blank spaces at the bottom of the page to find the correct term that is used for different types of lines in blueprints and CAD drawings. Then search for the word in the puzzle below and circle it. There are seven total answers. For extended practice, try indentifying these different types of lines with CAD drawings at work (as time allows).


t r e s d a b s z o k a
k v i s i b l e q e t d
r i e o f h e c t a e q
o u t c r e p t i r o u
e d i m e n s i o n y e
z k c a m r e o h t c i
c o h i d d e n e b e d
d y p e s d x i c s s o
u t c e a e t w s l u r
s v e n r c e n t e r p
s h a n i k n s i a c l
t z o n a r s a u d p a
e c h n u e i m t e e n
r m e d o t o c a r a t
v f w a z e n a r v d o

1. Short dashes of medium weight hidden.
2. Thin broken lines of long and short dashes center.
3. These lines end with arrowheads. They help to locate a particular dimension.
4. Thick continuous lines visible.

5. Continuations of the object line extension.

6. Thin, continuous and closely spaced lines section.

7. These lines are drawn at an angle and are used to point to notes that describe a particular feature. leader

Service Pack Dept. - New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER TRAINING CENTER/ OCM BOCES

"Metric Conversion for Blueprint Reading"

Exercise #1: Line Identification on Prints

Directions: Identify the lines (A through H) noted on drawing #_____. Write your answers in the spaces provided below.

A. _____

B. _____

C. _____

D. _____

E. _____

F. _____

G. _____

H. _____

Service Pack Dept. - New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER TRAINING CENTER/ OCM BOCES

"Metric Conversion for Blueprint Reading"

Exercise #2: Converting mm to inches on blueprints

Directions: The following metric numbers were taken from print #_____. Using your calculator and your knowledge of converting mm to inches, convert each of the following numbers. See if you can locate these numbers on the actual print and circle them.

1. 210.56 mm to _____ inches.
2. 209.80 mm to _____ inches.
3. 204.70 mm to _____ inches.
4. 173.76 mm to _____ inches.
5. 42.67 mm to _____ inches.
6. 112 mm to _____ inches.
7. 35.006 mm to _____ inches.

"Metric Conversion For Blueprint Reading"

Class #3

Objectives: Students will be able to:

1) ... complete Exercise #3-Line Identification with 75% accuracy.

2) ... complete Puzzle Power with 50% accuracy.

Activities:

1. Exercise #3-
2. Pass out metric rulers/explanation.
3. Rounding off numbers-Number Power 2

Break

4. "Puzzle Power" Calculator Power, p.46.
5. Review Exercise #2 (mm. to in.)
6. Introduce Calculator memory.

Service Pack Dept. - New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER TRAINING CENTER/ OCM BOCES

"Metric Conversion for Blueprint Reading"

Exercise #3: Line Identification on Prints

Directions: Identify the lines (A through H) noted on drawing _____. Write your answers in the spaces provided below.

A. _____

B. _____

C. _____

D. _____

E. _____

F. _____

G. _____

H. _____

Service Pack Dept. - New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER TRAINING CENTER/ OCM BOCES

"Metric Conversion for Blueprint Reading"

Exercise #2: Converting mm to inches on blueprints

Directions: The following metric numbers were taken from print number _____. Using your calculator and your knowledge of converting mm to inches, convert each of the following numbers. See if you can locate these numbers on the actual print and circle them.

1. 210.56 mm to _____ inches.
2. 209.80 mm to _____ inches.
3. 204.70 mm to _____ inches.
4. 173.76 mm to _____ inches.
5. 42.67 mm to _____ inches.
6. 112 mm to _____ inches.
7. 35.006 mm to _____ inches.

"Metric Conversion for Blueprint Reading"

Class #4

Objectives: Students will be able to:

1) ... complete Exercise #4 with 50% accuracy.

2) ... complete Exercise #5 with 50% accuracy.

3) ... complete Exercise #6 with 50% accuracy.

Activities:

1. Review-Identifying Lines on Prints
   Exercise #4

2. Notebook Organization

3. Review memory functions/Calculator
   Handout reference on Procedure for converting mm to inches.
   Exercise #5: Using the memory-mm to in.

4. Complete Tic/Tac/Toe
   3 groups

Break

5. Group work
   Exercise #6
   -Reading part identifiers
   -Highlighting prints

Service Pack Dept. - New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER TRAINING CENTER/ OCM BOCES

"Metric Conversion for Blueprint Reading"

Exercise #4: Line Identification on Prints

Directions: Identify the lines (1 through 10) noted on drawing #_____. Write your answers in the spaces provided below.

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

Service Pack Dept. - New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER TRAINING CENTER/ OCM BOCES

"Metric Conversion for Blueprint Reading"

Exercise #5: ★ Using Your Calculator's memory to convert millimeters to inches.

Directions: Complete each of the following metric conversion problems using your calculator's memory. Refer to the sequence below to help you with these problems.

1. Clear the calculator - [on/C]
2. Clear the memory - [m c] - press twice.
3. Enter 25.4 - press [m+] once.
4. Enter the problem information in millimeters and press the division sign [÷] . Or add, subtract the numbers in the problem and then complete this step (#4).
5. Press [m c] once. (25.4 should display).
6. Next press [=] .
7. ★ The number displayed will show the answer in inches and your conversion is completed for this problem.

Complete the problems below:

1. 20mm + 30 mm= _____ inches.
2. 40 mm + 60 mm= _____ inches.
3. 104.25 mm + 50.65mm= _____ inches.
4. 67.89 mm + 58.91 mm=_____ inches.
5. 38.46 mm + 72.51mm= _____ inches.
6. 125mm - 50 mm= _____ inches.
7. 75mm - 10mm= _____ inches.
8. 149.17mm - 56.18mm= _____ inches.
9. 179.63mm - 65.41mm= _____ inches.
10. 135.79mm - 34.16mm= _____ inches.

"Metric Conversion for Blueprint Reading"

Class #5

Objectives: Students will be able to:

1) ... complete the part ID-Exercise #6 on highlighting with 75% accuracy.

2) ... complete Exercise #7 with 75% accuracy.

3) ... begin Exercise #8.

Activities:

1. Teambuilding-Groupwork
   Exercise #6: Part ID (Team A,B)
   Highlighting

2. Tic/Tac/Toe
   Review memory functions/Calculator
   Exercise #7: Using the memory-mm to in.
   Complete Tic/Tac/Toe
   2 groups

Break

3. Group work
   Exercise #8
   -Line ID
   -Reading part identifiers
   -Highlighting prints

Service Pack Dept. - New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER TRAINING CENTER/ OCM BOCES

"Metric Conversion for Blueprint Reading"

Exercise #6: Problem Solving-Reading part identifiers on prints.

Directions: In groups of three, brainstorm to identify the differences between the two parts - # A and # B. Use the prints provided and list the differences that your group finds. Finally, use this information to identify and label the part numbers.

List the differences:

Label the parts: Part # A **/Part #** B

Part #1: _____

Part #2 _____

Service Pack Dept: New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER TRAINING CENTER / OCM BOCES

"Metric Conversion For Blueprint Reading"

Exercise #7: Metric Conversion Tic/Tac/Toe

Directions: 1. This game will be played with two teams A and B.

2. The first team to begin will select a problem 1-9 to complete. They will complete the problem and work together so that all teams members have the same answer displayed on their calculator. A reasonable amount ot time will be allotted.

3. The team's letter (A or B) will be placed on that square. The next team will proceed in the same manner choosing a different number.

4. If team members cannot agree on an answer, the team will lose its turn.

5. The two teams will continue until one of the teams has tic/tac/toe.

6. All players may use their calculators and metric conversion procedures.

Metric Conversion Problems for Tic/Tac/Toe

1. 125.43mm + 21.26mm = _____ inches.
2. 0.787mm + 0.213mm = _____ inches.
3. 111.25mm - 6.85mm = _____ inches.
4. 256.62mm - 15.35mm = _____ inches.
5. 175.50mm - 124.43mm = _____ inches.
6. 28.26mm + 22.75mm = _____ inches.
7. 63.761mm + 40.589mm = _____ inches.
8. 32.61mm + 10.83mm +4.285mm + _____ inches.
9. 432.256mm - 17.50mm = _____ inches.

5.775	4.108	2.008
9.499	2.011	4.110
1.879	.03937	16.329

Exercise #7 **METRIC CONVERSION**
TIC/TAC/TOE

Service Pack Dept.: NVG
Curriculum Dev: Paula Hayes

Service Pack Dept. - New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHYRSLER TRAINING CENTER/ OCM BOCES

"Metric Conversion for Blueprint Reading"

Exercise #8: Line Identification on Prints
Print # _____

Directions: Indentify the lines (1-9) noted on the print that is provided. Write your answers in the spaces below.

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

"Metric Conversion For Blueprint Reading"

Class #6

Objectives: Students will be able to:

1) ...complete the highlighting activity for Exercise #8 with 75% accuracy.

2) ...complete Exercise #9 with 85% accuracy on line identification.

Activities:

1. Team-building: Group work
   Exercise #8 (Highlighting exercise-what needs to be highlighted on this print in order to accurately identify the part.)

2. Exercise #9-Part Identification (Team A, B)
   Practice Exercise

3. Exercise #10: Demonstration exercise-Helical gears, micro inches and calculations- 2 groups (A and B).

Break

4. Reference Guides
   -Handout on Micro Finish
   -Blueprint Terminology-Blueprint Book
   -Highlighting prints-oral presentation/explanation

Service Pack Dept. - New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER TRAINING CENTER/ OCM BOCES

"Metric Conversion for Blueprint Reading"

Exercise #9: Problem Solving-Reading part identifiers on prints.
Main Shafts

Directions: In groups, brainstorm to identify the differences between the three parts- # A., B., and C. Use the prints provided and list the differences that your group finds. Finally, use this information to identify and label the part numbers.

List the differences:

Label the parts:Part # A., B, C

Part #1:_____

Part #2:_____

Part #3:_____

Service Pack Dept. - New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER TRAINING CENTER/ OCM BOCES

"Metric Conversion for Blueprint Reading"

Exercise #9: Problem Solving-Reading part identifiers on prints.
Part 2: Main Shafts
Part #'s: ___A___, ___B___, __C____

All Parts are similar with a few differences:

1. PART B has two .____ wide grooves added in the ___T spline area. (This should be highlighted.)

2. Part C -This is almost the same as part B except that there is a speedometer gear in the _____T spline area. This should be highlighted along with the two .___ wide grooves.

The overall length is approximately .___ inches longer than part B. This should also be highlighted.

SUMMARY:

1. All three parts should have their overall length highlighted.

2. The two .___ width grooves should be highlighted on part B and part C.

3. Part A should be highlighted in the ___T spline area and noted "no grooves."

4. Part C should have the speedometer gear highlighted. Parts A and B should be highlighted as to no speedometer gear in the ___T spline area.

*note: All part specific and print information has been deleted due to its confidential nature.

Service Pack Dept. - New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER TRAINING CENTER/ OCM BOCES

"Metric Conversion for Blueprint Reading"

Exercise #10: Demonstration Exercise-Part #_____.
Input Gear

Directions: Use high limit to calculate all of the answers below using your knowledge of metric conversion.

1. Calculate the overall length in inches._____in.

2. Calculate thickness of the __T Helical gear in inches.

_____inches.

3. Calculate the overall thickness of __T Helical gear in inches.

_____inches.

4. Calculate overall thickness of __T Helical gear in inches.

_____inches.

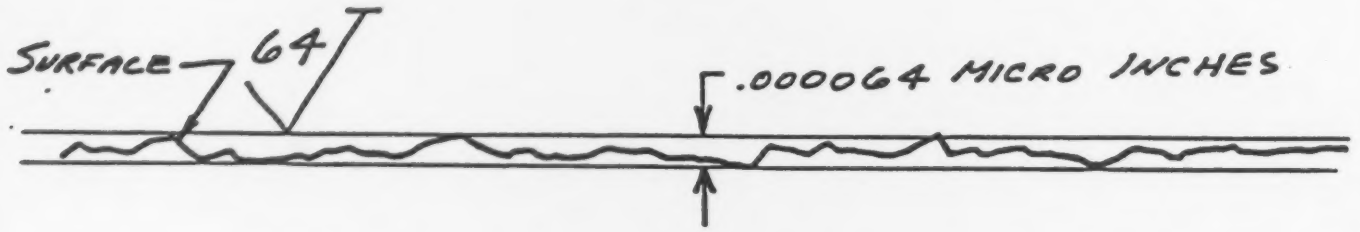
5. This problem requires a calculation which will be demonstrated.

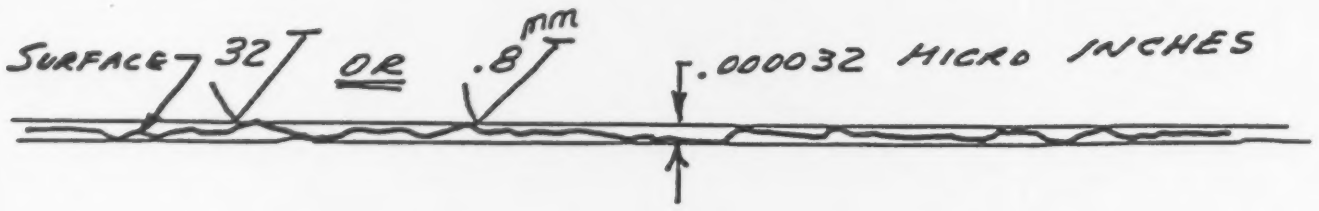
.8 RA ✓ = _____micro inches.

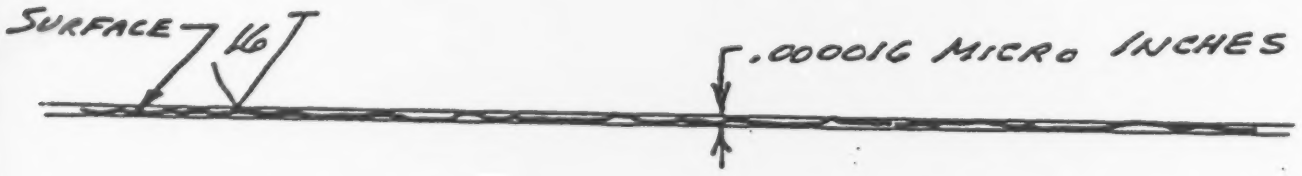
Service Pack Dept. - New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER TRAINING CENTER/ OCM BOCES

"Metric Conversion for Blueprint Reading"

Reference Handout : Micro Finish/Micro Inches







MM $\sqrt{0.5}$ = .020" OR .000020 MICRO INCHES

DEC. INCHES $\sqrt{20}$ = .020" OR .000020 MICRO INCHES

Diagram developed by:
Robert Cameron

"Metric Conversion For Blueprint Reading"

Class #7

Objectives: Students will be able to:

1) ...complete Exercise 10A with 75% accuracy.

2) ...complete Exercise #11-actual exercise on Micro Finish with 75% accuracy.

Activities:

1. Review Blueprint Terminology-Blueprint Book
   -question session

2. Decimal Review
   Calculator Book, pp.48-49.

3. Exercise 10A-Metric Conversion Calculation

Break

4. Review Micro Finish Reference Sheet
   Group work-Team A, B
   Exercise #11
   -Micro Finish
   -Blueprint Terminology
   -Highlighting Prints

Service Pack Dept. - New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER TRAINING CENTER/OCM BOCES

"Metric Conversion for Blueprint Reading"

Exercise #10A: Part #_____

REVIEW EX. Input Gear

Directions: Use high limit to calculate the answer below using your knowledge of metric conversion.

Calculate the width of the ___T Spur gear in inches.

Example- Reference: 45.00mm. - 27.32mm. = _____inches.

*note- This reference was for a particular part.

Service Pack Dept. - New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER TRAINING CENTER/ OCM BOCES

"Metric Conversion for Blueprint Reading"

Exercise #11: Actual Exercise - Part #_____
Third Speed Gear

Directions: Use the high limit to calculate all of the answers below using your knowledge of metric conversion.

1. Convert Bore Micro Finish on Bore to micro inches.

_____

2. Convert Micro Finishes on Gear Faces.

_____

3. Convert Micro Finish on Cone Angle.

_____

4. What is the overall thickness of this gear in inches? (Use the high limit)

_____

5. What is the Bore Diameter in inches? (Use high limit)

_____

"Metric Conversion For Blueprint Reading"

Class #8

Objectives: Students will be able to:

1) ...complete Exercise #12 on part specific information with 50% accuracy.

2) ...complete Practice Exercise #13 using metric calculations and part specific information with 50% accuracy.

Activities:

1. Review Session
   -Blueprint Terminology

2. Exercise #12- Specific Part Information
   -Metric conversion/calculation
   -grooves
   -diameter
   -helical/spur
   -splines/serrations

Break

3. Exercise #13-Practice Exercise
   -metric calculations
   -micro finish
   -gear teeth types
   -splines

Service Pack Dept. - New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER TRAINING CENTER/ OCM BOCES

"Metric Conversion for Blueprint Reading"

Exercise #12: Specific Part Information
Refer to Print #_____ (used during session #6)

Directions: Answer the following questions as accurately as possible. Try to do these questions on you own. This will give the instructors information for review sessions. Thank you.

1. Specify the number of grooves _____

2. What is the groove width? _____

3. Specify the largest diameter of the part._____

4. A. What is the symbol that tells you that a surface has been ground?_____

   B. How many surfaces are ground? _____

5. Refer to the micro Finish symbols on this print.

   A. What is the smoothest micro finish? _____

   B. What is the roughest micro finish?_____

6. How many splines are on this part? _____

7. How many serrations are on this part?_____

8. Are the splines and serrations Helical or spur?
   _____

Service Pack Dept. - New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER TRAINING CENTER/OCM BOCES

"Metric Conversion for Blueprint Reading"

Exercise #13: Practice Exercise

Directions: Use print #_____ (wk #2) to complete the following questions.

1. Calculate the overall length of this part.

_____

2. Note the micro finish designations on these areas:

a. Leader lines	Bearing face
	Bearing surface
b. extension lines	Bore
	Cone Angle
	Oil Seal
c. Actual surfaces	Pilot End (left)

Make the actual calculations from mm. to micro finish where possible.

3. Explain gear tooth type (helical).

_____

4. Explain what is meant by internal involute spline.

_____

5. Note what is important information concerning the ___T spline.

_____

"Metric Conversion For Blueprint Reading"

Class #9

Objectives: Students will be able to:

1) ...answer questions on handout #13 for review with another print with 75% accuracy.

2) ...complete review Exercise #14-Review of metric conversions, with 85% accuracy.

Activities:

1. Review Session
   (There was a two week vacation break for Christmas.)
   -Blueprint Terminology
   -question session

2. Review Exercise #13 (may substitute another print).
   -metric calculations
   -micro finish
   -gear teeth types
   -splines

Break

3. Exercise #14- Review exercise of metric conversions.

Service Pack Dept. - New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER TRAINING CENTER/OCM BOCES

"Metric Conversion for Blueprint Reading"

For REVIEW-class #9

Exercise #13: Practice Exercise

Directions: Use print #_____ to complete the following questions.

1. Calculate the overall length of this part.

   _____

2. Note the micro finish designations on these areas:

   a. Leader lines — Bearing face, Bearing surface
   b. extension lines — Bore, Cone Angle, Oil Seal
   c. Actual surfaces — Pilot End (left)

   Make the actual calculations from mm. to micro finish where possible.

3. Explain gear tooth type (helical).

   _____

4. Explain what is meant by internal involute spline.

   _____

5. Note what is important information concerning the ___T spline.

   _____

Service Pack Dept. - New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER REGION 9 TRAINING CENTER/OCM BOCES

"Metric Conversion for Blueprint Reading"

Exercise #14: **Review Exercise**

Directions: Use Print #_____ to answer the following questions. All questions should be converted to decimal inches and the high limit should be used for these conversions.

1. Calculate the overall length.

_____

2. What is the length of the ___T spline area?

_____

3. What is the length of the ___T spline?

_____

4. Calculate the length of ___T spline. _____ mm to _____ in.

_____

5. What is the largest diameter of the part?

_____

6. What is the pilot diameter (reference-left side of the print)?

_____

7. How many diameters are ground?

_____

8. What is the smoothest surface finish?

_____

9. How many splines are shown? (**Hint:** look at all broken sections)

_____

10. How many **FACE** grinds are shown?_____

What is the surface finish?_____

"Metric Conversion For Blueprint Reading"

Class #10

Objectives: Students will be able to:

1) ...complete Exercise #15 -review of metric conversions with 100 % accuracy.

Activities:

1. Review Session
   -Blueprint Terminology
   -question session

2. Review of Exercise #14
   -metric calculations
   -micro finish

Break

3. Exercise #15: review of metric conversions.

Service Pack Dept. - New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER REGION 9 TRAINING CENTER/OCM BOCES

"Metric Conversion for Blueprint Reading"

Exercise #14: **Review Exercise**

Directions: Use Print #_____ to answer the following questions. All questions should be converted to decimal inches and the high limit should be used for these conversions.

1. Calculate the overall length.

_____

2. What is the length of the ___T spline area?

_____

3. What is the length of the ___T spline?

_____

4. Calculate the length of ___T spline. _____ mm to _____ in.

_____

5. What is the largest diameter of the part?

_____

6. What is the pilot diameter (reference-left side of the print)?

_____

7. How many diameters are ground?

_____

8. What is the smoothest surface finish?

_____

9. How many splines are shown? (**Hint:** look at all broken sections)

_____

10. How many **FACE** grinds are shown?_____

What is the surface finish?_____

Service Pack Dept. - New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER TRAINING CENTER/ OCM BOCES

"Metric Conversion for Blueprint Reading"

Exercise 15: Review of all information in regard to metric conversion and parts in Service Pack Dept.

Directions: Use the high limit to convert the metric number to decimal inches. Use your calculator and the memory function.

#1-2: Refer to print #_____ (From class session #7)

1. What is the width of ___T gear?
2. What is the major diameter (OD) of gear?

#3-6: Refer to print #_____ (From class session #4)

3. What is the diameter of the bolt circle for the ___ tapped holes?
4. What is the bore diameter?
5. What is the thickness of the gear?
6. What is the micro finish of the bore?

#7-9: Refer to print #_____

7. What is the bore diameter and what is the micro finish?
8. What is the major diameter?
9. What type of gear is shown and how many teeth does it have?

#10: Refer to print #_____ & #_____ (From class #5)

10. What is the difference between the (2) parts?

    List differences -

"Metric Conversion for Blueprint Reading"

Class #11

Objectives:

1) Students will complete post survey with 100% accuracy.

Activities:

1. **Review Session-Exercise #16**
   -Blueprint Terminology
   -review metrics
   -review part specific info
   -question session

2. BREAK
   View tape of "Service Pack" Ch. 9
   *note-This was a television interview of this class.

3. Directions and Rationale for post-survey.
   Post-Survey (individualized)

Service Pack Dept. - New Process Gear
Curriculum Developer: Paula Hayes
UAW CHYSLER TR. CT./BOCES

"Metric Conversion for Blueprint Reading"

Review Exercise #16: Complete Review of the course outline and question/answer session.

1. Review metric conversion number. (25.4) and the process.
   -Each student should tape on their calculator that 25.4mm. = 1.000 inch
   -Rounding off decimal dimensions to three places.
   Example: 5.783642 = 5.784

2. Review general blueprint terminology.

   -micro finish
   -spur/helical gears
   -spline/serrations (How to locate the spline on the print)

3. Part specific information.

   -reading part identifiers
   groove locations
   amount of grooves

   How to tell exactly what needs to be ground on a part.
   Usually 32 micro inches or less indicates a ground or hard turned surface. (on metric prints this would equal .8.)

   How to count teeth on a part
   Review the process of using markers to correctly count teeth, splines, or similar features to prevent errors.

   Blue print file (Service Pack)
   Using a marker, specific items should be highlighted on the print to be checked each time that the print for the part is involved.

Service Pack Dept. - New Venture Gear
Curriculum Developer: Paula Hayes
UAW-CHRYSLER TRAINING CENTER/ OCM BOCES

"Metric Conversion for Blueprint Reading"

Pre and Post Survey

Directions: Following is a survey of information that may be used in the Service Pack Department at New Venture Gear. This survey is being given in order to determine the course content from the workers' perspective and assess the needs of the participants. In addition, the information from this survey will help to determine the success of the course content. This same survey will be given again at the completion of the course.

Please use the numbered parts, the CAD drawings, and the calculator to complete these ten questions. It would be most useful for our curriculum development if you did not guess on this questionaire or discuss the questions with other participants. All information is confidential and ungraded.

1. What is 1mm equal to in inches?_____

2. Using the calculator, convert 168mm to inches._____

3. Compare Part #_____ and part #_____. What is the difference between these two parts?

4. Using the high limit for calculations, what is the major diameter of Gear #_____ in inches? _____

   Gear #_____ in inches? _____

5. What is the overall thickness in inches of these two parts?
   _____

6. Indicate the symbol that is used to represent a ground surface._____

7. On part #_____, how many surfaces are ground?
   _____

8. What's the difference between part #_____ and part #_____?
   _____

9. Is part #_____ a helical or spur gear?
   _____

10. Refer to part #_____.
    How many splines are there?_____

    How many serrations are there?_____

"Metric Conversion For Blueprint Reading"

Class #12

Objective:

1. Students will be able to understand the results of the pre/post survey.

Activities:

1. Results of Pre/Post Survey

2. Certificate of Completion Ceremony
   -Supervisors
   -Managers
   -Training Director
   -Administrators

3. "Graduation Party"

Service Pack Dept.-New Process Gear
Project Manager: Carol Turnbull
Curriculum Developer: Paula Hayes
UAW-CHRYSLER TR.CT./BOCES

"Metric Conversion for Blueprint Reading"

Results of Pre and Post-Assessment
February 7, 1992

This course was initiated based on the job task analysis of the Service Pack department of New Process Gear. The job task analyst, Margaret Hamstead, interviewed two employees and both supervisors in order to assess the training needs of this department. She also gained valuable input by asking all of the employees to list the areas that they felt would be most beneficial. This information along with Margaret's assessment of the training needs formed the basis for the curriculum development. The course description, goals and objectives, and course outline were then developed.

The course was designed to provide a hands-on learning approach for each participant. Individualized learning, communication skills, and team-building were an integral part of this course. Four BOCES instructors were involved to provide individualized instruction. Fred Gonroff and Bob Cameron provided the technical expertise to make this course a success, while Carol Turnbull and I served as basic skills instructors, curriculum developers, and facilitators. The materials developed for this course were job specific and utilized NPG prints and parts.

There were twenty employees who received training in metric conversion and blueprint reading. Each participant was administered a pre-survey before the first class and this was given again at the end of the course as a post-survey. This survey was developed to provide additional information for curriculum development and to chart the progress of each of the employees. The participants were not given any assistance during either segment of the survey.

The final results of this evaluation were very positive. The overall average of the pre-survey was 10% while the group average of the post-survey after twenty hours of instruction was 82%. More than 50% of the class achieved an 85% or better on the post-survey. The difference between the pre and post-survey was an impressive 72% for this group. This was a remarkable achievement for these participants in such a short period of time.

The success of this course was due to the collaboration between union and management, the willingness and enthusiasm of the Service Pack department, the contributions of all of the instructors, and the job specific nature of this course. These participants will be able to reinforce the skills learned in this course as they continue to perform their daily job tasks.

Supplemental Materials

Howett, Jerry (1988). Contemporary's Number Power 2: Fractions, Decimals, Percents. Chicago, Illinois: Contemporary Books, Inc.

Mitchell, Robert (1991). Contemporary's Calculator Power. Chicago, Illinois: Contemporary Books, Inc.

Pouler, Wilfred B. (1984). Print Reading For The Machine Trades. Albany, NY: Delmar Publishers Inc.

Machine Operators: New Process Gear
Curriculum Developer:Paula Hayes
UAW-CHRYSLER TC/ BOCES

"Math For SPC"

Course Description: The Machine Operators have been targeted for training in math skills for Statistical Processing Control (SPC). The goal of "Math for SPC" training is to improve workers' understanding of the math concepts and terminology specific to in-house SPC training. This training is intended to make the SPC classes more enjoyable and valuable. In addition, since SPC charting is used by machine operators on a daily basis, workers' will be able to reinforce the skills learned in the classroom on the job.

Objectives:

Participants will be able to:

1. Use a calculator with 100% accuracy to perform the basic math functions of addition, subtraction, multiplication, and division for both positive and negative numbers.
2. Compute averages and ranges using a calculator with 100% accuracy.
3. Demonstrate an understanding of place value to the .0001 with 100% accuracy.
4. Demonstrate the ability to round numbers to the nearest place value as necessary with complete accuracy.
5. Verbally define and use the technical terminology of SPC training with 95% accuracy.
6. Demonstrate the ability to plot points for SPC on a chart with 100% accuracy.

Machine Operators - New Process Gear
Curriculum Developer:Paula Hayes
UAW-CHRYSLER TR.CT./BOCES

"Math For SPC"

Curriculum Outline:

I. Introduction to SPC terminology

II. Calculator Use with Math Skills

A. Introduction to Calculator functions

B. Basic Math functions review

1. Positive/Negative numbers

2. Skill Review
   a. Addition
   b. Subtraction
   c. Multiplication
   d. Division

3. Place value
   a. Tenths (.1)
   b. Hundredths (.01)
   c. Thousandths (.001)
   d. Ten-Thousandths (.0001)

4. Rounding to the nearest place value with practice problems

III. SPC Functions

A. Computing Averages

B. Computing Range

C. Plotting Points on SPC charts

D. Working with Coded Data

Crucible Specialty Metals/Bar Finish Dept.
Course Overview/Goals
Curriculum Developer: Paula Hayes
May 22, 1992

Procedural Documentation

Course Overview: The Bar Finish Department has been targeted for training specifically geared to understanding the mill ticket form in regard to mill procedures and operations. The training will be designed to integrate communication and decision making skills with technical reading and writing, industrial related math skills, and documentation of work performed. This course will form the basis for more technical training as it provides an overview of several of the mill's operations. It will also address the needs of the department as it will provide job specific training in the areas of technical vocabulary, measuring devices, math for process control, and metrics. In addition, since these skills will be used on a daily basis, workers' will be able to reinforce the skills learned in the classroom on the job.

Objectives:

Participants will be able to:

1. Demonstrate an overall understanding of the mill ticket.
2. Use technical vocabulary and writing skills to improve the documentation of work performed.
3. Perform basic math functions as necessary to complete mill forms.
4. Demonstrate an understanding of process control and use the math skills necessary to make charts and graphs.
5. Convert metric measurements as needed for specific job functions.

Crucible Specialty Metals/Bar Finish Dept.
Course Outline
Curriculum Developer: Paula Hayes

Procedural Documentation

I. Course Overview and Introductions
   A. Goals and Philosophy
   B. Introductions-Small group exercise

II. Pre-Assessment
   A. Basic skills Inventories
   B. Job specific skills

III. Overview of Mill Ticket
   A. Technical Vocabulary
   B. Reading Comprehension
      1. Processing Information
      2. Comprehension of entire mill ticket
      3. Sequencing Information
   C. Operational procedures
      1. Problem solving
      2. Communication skills
      3. Decision making skills
   D. Technical Writing
      1. Standard Work Order Procedures
      2. Documentation of work performed
      3. Correct use of technical terminology
      4. Accuracy of logging information in designated areas
      5. Spelling skills for technical terminology

IV. Mathematics for Industry
   A. Basic Mathematics
      1. Fractions
      2. Decimals
      3. Percents
   B. Calculator Functions
   C. Measuring Devices
      1. Scales
      2. Micrometers
      3. Reading dial indicators
   D. Math for Process Control
      1. Computing averages
      2. Computing range
      3. Understanding data collection for quality control
      4. Understanding tolerances and control limits
      5. Plotting points/making charts and graphs
   E. Metric Measurements
      A. The metric system
      B. How to use conversion charts
      C. Calculator conversion (ex. mm. to inches)

V. Post-Assessment

Oberdorfer Industries
UAW-CHRYSLER Region 9 Training Center/OCM BOCES
Curriculum Developer: Paula Hayes
Proposed Curriculum: Overview/Objectives
October 13, 1992

"Math for Charting"

Course Overview: The proposed course's objectives and outline are based on information compiled from the job task analysis prepared by Margaret Hamstead. The training recommendations are for a course designed to provide the Green Sand Foundry workers with basic skills in math computation and calculator use, reading and writing reinforcement of technical terminology, and an introduction to "learning to learn" skills that will help workers to successfully complete in-house charting procedures. This course will use company developed charts, foundry terminology, and focus on collaborative/ team-approach learning techniques. The goal of this training is to provide participants with a positive hands-on learning experience in which the math concepts and charting processes will be regularly reinforced on the job.

Overall Course Goal: The overall course goal is to provide basic math and charting instruction in order for participants to gain the skill necessary to successfully complete in-house statistical processing control training.

Course Objectives:

At the completion of the course, participants will be able to:

1. Use a calculator with 100% accuracy to perform the basic math functions of addition, subtraction, multiplication, and division for both positive and negative numbers.

2. Compute averages and ranges using a calculator with 100% accuracy.

3. Demonstrate an understanding of place value to the .0001 with 100% accuracy.

4. Demonstrate the ability to round numbers to the nearest place value as necessary with 100% accuracy.

5. Plot points on charts with 100% accuracy.

6. Read, write, and demonstrate the ability to use technical terminology with 85% accuracy.

7. Read gauges that are used in the foundry with 100% accuracy.

8. Demonstrate the application of "learning to learn" theory and put it into practical experience with job specific materials.

Oberdorfer Industries
UAW-CHRYSLER Region 9 Training Center/OCM BOCES
Curriculum Developer: Paula Hayes
Proposed Curriculum: Course Outline
October 13, 1992

"Math for Charting"

I. **Course Overview and Introductions**
   - A. Goals and Philosophy
     1. The role of the instructor as a facilitator
     2. Group instruction vs. individualization
   - B. Introductions - Small group exercise

II. **Pre-Assessment**
   - A. Basic math functions
   - B. Fractions/Decimals/Percents
   - C. Charting Skills

III. **"Learning to Learn Techniques"**
   - A. Organizational/Time Management Skills
   - B. Learning Styles
   - C. Memory Tricks for procedures and terminology
   - D. Reading/Writing Technical Terminology (see attachment)
     1. Using Department specific terms
     2. Introduction to process control vocabulary
   - E. Reading gauges for measuring hardness/moisture content
   - F. Understanding charts and graphs in relation to:
     1. The moisture content of the sand
     2. The gas content in the aluminum
     3. The hardness of the finished molds
   - G. The Team Approach for problem solving

IV. **Calculator Use with Math Skills**
   - A. Introduction to calculator functions
   - B. Basic math functions review
     1. Positive/negative numbers
     2. Skill review
        - a. Addition
        - b. Subtraction
        - c. Multiplication
        - d. Division
     3. Place value
        - a. Tenths (.1)
        - b. Hundredths (.01)
        - C. Thousandths (.001)
        - d. Ten-thousandths (.0001)
     4. Rounding to the nearest place value

V. Charting Functions
   A. Computing averages
   B. Computing range
   C. Plotting points on charts (examples)
      1. # of molds made
      2. tons of sand used
      3. pounds of ingots melted

VI. Post-Assessment
   A. ETS - Test of Adult Literacy
   B. Basic math skills/Charting

MATH FOR CHARTING

Oberdorfer Industries December-January 1992-1993

In this class you will learn to

- Use a calculator for
  - adding
  - subtracting
  - multiplying
  - dividing
  - finding an average
  - finding a range
- Round numbers to the nearest place value
- Plot points, averages, and ranges on a chart
- Read gauges used in the foundry
- Understand and calculate fractions and percents
- Use the common terms of the foundry

"Math for Charting"

Oberdorfer Industries: Green Sand Dept.
Curriculum Developers: Paula Hayes
Carol Turnbull
Margaret Hamstead
UAW-CHRYSLER REGION 9 TRAINING CENTER/
OCM BOCES

Agenda: Class #1
December 10, 1992
2:30 - 3:30

Materials Needed:
Overhead projector, transparencies, marker pens, flip charts
Individual folders:
- Pencil
- paper
- Course/graphic overview
- vocabulary list
- Pre-assessment
- Chart for hours worked

2:30 - 2:50 Coffee, Donuts, and Introductions/
(M & C)
(Carol) warm-up -groups of three (find as many things in common in five minutes, not work related.

2:50 - 3:15 Directions/ Contextualized Pre-assessment
(Margaret)

3:15 - 3:30 Calculator Introduction
(Carol) Function Keys/ Addition
Making a chart of hours worked M-F
Adding them up

Word of the Day
(Margaret)
Other Activities: Flip chart vocabulary board

MATH FOR CHARTING
Pre-Test

If you want to, use a calculator to find the answers to these problems.

1. Last month Oberdorfer manufactured 1,234 parts. This month we made 1,598. How many parts is that total for the two months?

2. Jim has to divide 276 gaggers among 3 men. How many gaggers will each man get?

3. An acceptable range for variance is +5 and -3. Circle the numbers that are within that range:

   3 -5 -2 4

4. Circle the largest number.

   10.901 0.0001 0.991 2.8

5. Circle the smallest number.

   15.901 0.0001 0.912 10.000

6. Round these numbers off

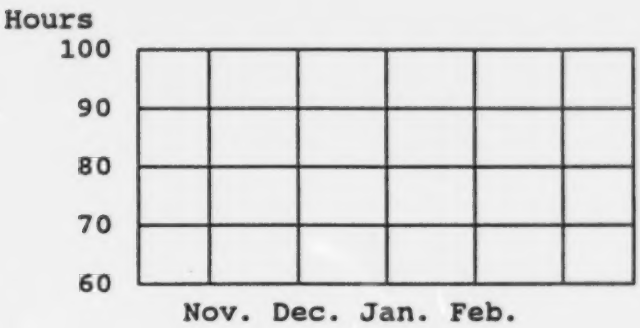
   to the nearest tenth: 24.56

   to the nearest hundredth: 8.857

   to the nearest whole number: 353.42

7. On the chart below, plot these points.

100 hours in November
80 hours in December
95 hours in January
75 hours in February

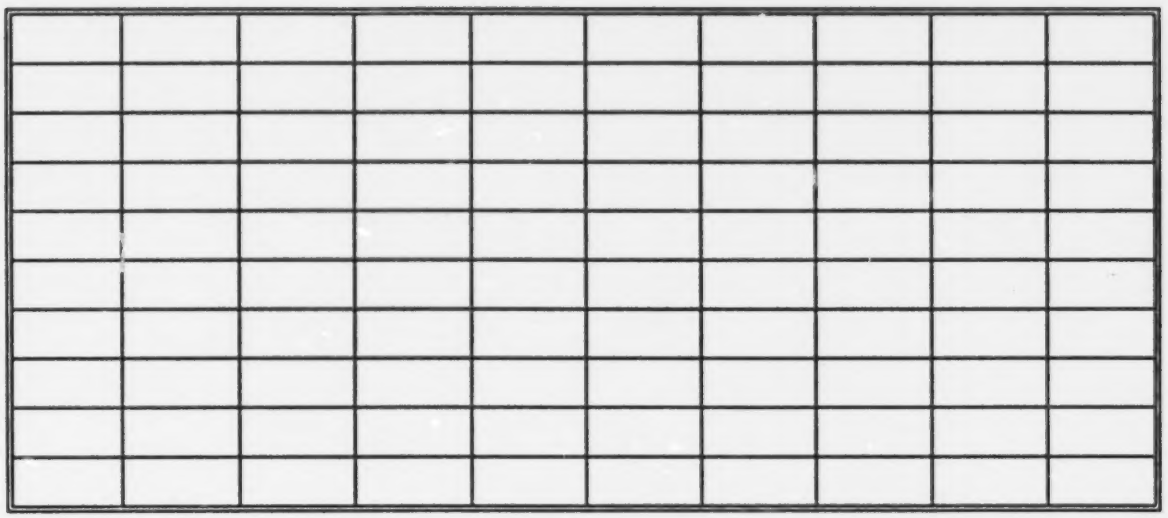


Now the calculate the average number of hours per week.

CALCULATOR KEYPAD

MC	MR	M-	M+	
ON/OFF	7	8	9	÷
√	4	5	6	X
%	1	2	3	-
C	0	.	=	+

MAKE-YOUR-OWN CHART



MATH MANIA
for
IFG MACHINE OPERATORS

GOALS

- To use mathematical tools and thinking and writing processes effectively, so that workers can provide management with opportunities to run the business more efficiently.

- To improve understanding and commitment to the need for individual responsibility in the Company's viability and in learning for life.

OBJECTIVES

- To improve the use of basic math skills in work-related contexts:

  -Finding and understanding averages

  -Finding and understanding percentages

  -Making histograms and charts

  -Understanding totals that involve subtraction

  -Using calculators meaningfully

  -Understanding and using the ten-thousands place value

- To understand the importance of accurate data collection and reporting

  -Understanding how data drives business decisions

  -Understanding the need to respond to new methods (learning for life)

MATERIALS

Machine Utilization and Scrap Chart
Machine Utilization and Scrap Report
CECOR Scrap Tag
Hold Tags
Utilization Sheet (supervisor form)
Material Labels
WHATS Diagram

MATH MANIA PRE-TEST

You may use calculators!

1. The beginning reading of the machine counter shows:

4	5	8	9	9

When one more part is run, the counter will show:

2. If the counter shows

2	9	8	2	9

at the beginning of the day, and

3	3	8	9	0

at the end of the day, how many parts were run?

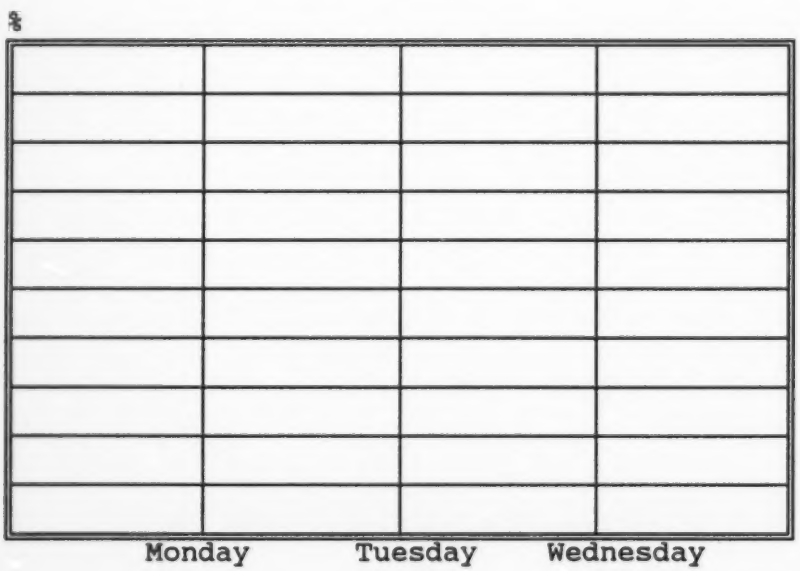
3. The number of parts run by three IMMOs on Monday was:
1,500 2,569 959

What was the average number of parts run?

4. Out of 25,389 parts run, 3,900 ~~was~~ were scrap. Write the amount of scrap to parts run as a fraction, a decimal, and a percent.

5. Chart these values on the graph below.

Monday 80% Tuesday 95% Wednesday 88%



MATH MANIA

Lesson 1. Introduction to Course

Objectives
- To build rapport
- To refine sense of group needs/interests

Activities

Explain the program
- Purpose
- Role of facilitator(s)
- Distribute class packets and explain

Play introductory game
- Small group activity
- Presentation to whole group

Brainstorm needs/interests
- Small group "wish" lists
- Compile list as whole group

Pre-test
- Explain purpose
- Administer, reading aloud as necessary

Summarize session
- Looking back, looking forward

Materials
- Flipchart/markers
- Individual packets
- Writing materials
- Pre-tests

WORKPLACE SKILLS IMPROVEMENT PROJECT

COURSE: Math Mania for Machine Operators COMPANY: Inland Fisher Guide

SITE: _____ DATE: _____

SESSION TOPIC: Introduction

OVERALL GOAL(S): Improve Basic Math Skills

_____

OBJECTIVES	ACTIVITIES	TECHNIQUES METHOD/s	MATERIALS	TIME
To build rapport	Present program-- purpose and structure	Discussion Explanation	Class packets	
	Introduce group members	Game	Writing materials	
To refine sense of group needs/interests	Verbalize expectations	Brainstorm in small/large groups	Flipchart	
	Pre-test	Read aloud if necessary	Pre-test	

EVALUATION OF SESSION

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_____

FOLLOW-UP FOR NEXT SESSION

_____

_____

UAW Chrysler Training Center/BOCES
Paula Hayes, Margaret Hamstead

WORKPLACE SKILLS IMPROVEMENT PROJECT

COURSE: Math Mania COMPANY: Inland Fisher Guide

SITE: _____ DATE: _____

SESSION TOPIC: 1. Finding Counter Totals to the Ten-Thousands

OVERALL GOAL(S): Improving the use of basic math skills in work-related contexts

OBJECTIVES	ACTIVITIES	TECHNIQUES METHOD/s	MATERIALS	TIME
To Find Totals by Subtracting	Solve problems Discussion	Explanation Experiential Modeling Connections with home contexts	Counter graphics Odometers Pencils, papers Folders Scrap Report	
To Find Totals by Adding	"			
To Estimate Totals	", adding/subtracting			
To Use the Calculator to Find Totals	", "		Calculators Charts	
	Session summary	Writing		

EVALUATION OF SESSION

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FOLLOW-UP FOR NEXT SESSION

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UAW Chrysler Training Center/BOCES
Paula Hayes, Margaret Hamstead

WORKPLACE SKILLS IMPROVEMENT PROJECT

COURSE: Math Mania for Machine Operators COMPANY: Inland Fisher Guide

SITE: _____ DATE: _____

SESSION TOPIC: 2. Making Charts and Histograms

OVERALL GOAL(S): Improving Basic Math Skills

OBJECTIVES	ACTIVITIES	TECHNIQUES METHOD/s	MATERIALS	TIME
To review counter totals	Adding, subtracting Recording List home/work applications	Discussion Small groups Estimating	Worksheets Writing materials Posters Calculators	
To make histograms	Compile data Create chart forms Chart data	Explanation Modeling Small groups	MU and Scrap Report MU and Scrap Chart	
To clarify learning	Summary writing	Modeling, brainstorming		

EVALUATION OF SESSION

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FOLLOW-UP FOR NEXT SESSION

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UAW Chrysler Training Center/BOCES
Paula Hayes, Margaret Hamstead

WORKPLACE SKILLS IMPROVEMENT PROJECT

COURSE: Math Mania for Machine Operators COMPANY: Inland Fisher Guide

SITE: _____ DATE: _____

SESSION TOPIC: 3. Finding and Charting Averages

OVERALL GOAL(S): Improving Basic Math Skills

Understanding the Importance of Accurate Data Collection

OBJECTIVES	ACTIVITIES	TECHNIQUES METHOD/s	MATERIALS	TIME
To understand and calculate averages	Find totals and averages in home and work contexts	Explanation Discussion Small group searches	Newspapers	
To understand the uses of averages in the work context	Presentation by Bill Sutherland	Listening Open forum		

EVALUATION OF SESSION

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FOLLOW-UP FOR NEXT SESSION

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UAW Chrysler Training Center/BOCES
Paula Hayes, Margaret Hamstead

WORKPLACE SKILLS IMPROVEMENT PROJECT

COURSE: Math Mania for Machine Operators COMPANY: Inland Fisher Guide

SITE: _____ DATE: _____

SESSION TOPIC: 4. Understanding Fractions and Decimals

OVERALL GOAL(S): _____

_____

OBJECTIVES	ACTIVITIES	TECHNIQUES/s METHOD/s	MATERIALS	TIME
To understand the meaning of part to whole	Find part to whole relationships in home/work	Discussion Brainstorming in small/large groups	Newspapers Scrap tags Scrap Reports	
To express part to whole as fractions and decimals	Write fractions and convert to decimals	Explanation Modeling Experiential in small groups/ individually	Calculators	

EVALUATION OF SESSION

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FOLLOW-UP FOR NEXT SESSION

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UAW Chrysler Training Center/BOCES
Paula Hayes, Margaret Hamstead

WORKPLACE SKILLS IMPROVEMENT PROJECT

COURSE: Math Mania for Machine Operators COMPANY: Inland Fisher Guide

SITE: _____ DATE: _____

SESSION TOPIC: 5. Putting It Together: Charting Decimals

OVERALL GOAL(S): Improving Basic Math Skills

Understanding the Importance of Accurate Data Collection

OBJECTIVES	ACTIVITIES	TECHNIQUES/s METHOD/s	MATERIALS	TIME
To chart decimal values	Find decimal values by estimating	Explanation Discussion Modeling	MU and Scrap Chart Newspapers	
	Create charts with decimal units	" Small groups	Graph paper Writing materials	
To clarify understanding	Write procedure for charting	Small group Large group debrief		
To understand how inaccurate data can impact business	Presentation by Bill Sutherland	Discussion- Open Forum		

EVALUATION OF SESSION

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FOLLOW-UP FOR NEXT SESSION

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UAW Chrysler Training Center/BOCES
Paula Hayes, Margaret Hamstead

WORKPLACE SKILLS IMPROVEMENT PROJECT

COURSE: Math Mania for Machine Operators COMPANY: Inland Fisher Guide

SITE: _____ DATE: _____

SESSION TOPIC: 6. Review and Summary of Project

OVERALL GOAL(S): Evaluate Effectiveness of Training

Determine Possible Next Step for Learners

OBJECTIVES	ACTIVITIES	TECHNIQUES/s METHOD/s	MATERIALS	TIME
To review class objectives	Complete work forms, given data	Individually in small groups	Data Sheets MU and Scrap Report Utilization Sheet MU and Scrap Chart CECOR Scrap Tag Material Labels	
To refine understanding of topics				

EVALUATION OF SESSION

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FOLLOW-UP FOR NEXT SESSION

_____

_____

WORKPLACE SKILLS IMPROVEMENT PROJECT

COURSE: Math Mania for Machine Operators COMPANY: Inland Fisher Guide

SITE: _____ DATE: _____

SESSION TOPIC: 7. How Did We Do?

OVERALL GOAL(S): Improving Basic Math Skills

Understanding the Importance of Accurate Data Collection

OBJECTIVES	ACTIVITIES	TECHNIQUES/s METHOD/s	MATERIALS	TIME
To evaluate individual performance	Post-test	Read orally, if necessary	Test	
To celebrate!	Party			

EVALUATION OF SESSION

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_____

FOLLOW-UP FOR NEXT SESSION

_____

_____

UAW Chrysler Training Center/BOCES
Paula Hayes, Margaret Hamstead
Paula Hayes, Margaret Hamstead

New Process Gear: Skilled Trades
UAW-CHRYSLER REGION 9 TRAINING CENTER/BOCES
Job Task Analyst/Instructor: Margaret Hamstead
Curriculum Developer: Paula Hayes
Case Manager/Instructor: Carol Turnbull

"Metric Immersion for Skilled Trades"

Course Overview: This course has been designed to provide an opportunity for the skilled trades workers of New Process Gear to use metrics in a variety of practical situations. Since the job task analysis completed by Margaret Hamstead indicated a strong need for workers to become more involved and comfortable with metrics, the class activities will be related to the different skills needed for these jobs. The course will provide hands-on practice with all types of metric measurements and allow participants to become "immersed" in the metric concepts. As a supplier to other nations, the company and the workers need to move towards metrics in order to remain competitive in this global economy.

Overall Goal: The overall goal of this course is to provide participants with an understanding of metric concepts and hands-on experience with making all types of metric calculations.

Course Objectives: At the completion of the course, participants will be able to:

1. Understand and verbalize the need for metrics as it relates to their job.

2. Estimate metrics in a variety of situations.

3. Perform a variety of contextualized metric hands-on exercises in terms of linear measures, volume, pressures, and temperatures.

4. Understand and use formulas to convert standard measurements to metrics and metrics to standard.

5. Use calculators and other devices such as gauges and indicators to perform conversions from standard to metric and metric to standard.

New Process Gear: Skilled Trades
UAW-CHRYSLER REGION 9 TRAINING CENTER/OCM BOCES
Curriculum Developer: Paula Hayes

"Metric Immersion for the Skilled Trades"

I. Introduction to "Metric Immersion"
   A. Course Overview/Outline
      1. Goals and objectives
      2. Warm-up exercise and introductions
      3. Student input and brainstorming activities
         a. How are metrics currently used on your job?
         b. How would you like to learn metrics?
   B. Pretest
      1. ETS- Test of Applied Literacy Skills
         a. Questionaire
         b. Document
         c. Quantitative
         d. Prose
      2. Metrics

II. Introduction to the Metric System of Measurement
   A. Estimating using Metrics
      1. Linear measures (meter, cm, mm)
         a. diameters
         b. length
         c. width
         d. height
      2. Volume/volume ratios
         a. liters
         b. cc
         c. ml
      3. Pressures
      4. Temperature
   B. Performing Actual Measurements accurately in Metrics
      1. Using metric measurement devices and tools
      2. Checking estimations
      3. Understanding the relationship and differences
         a. standard to metric
         b. metric to standard

III. Introduction to Using Formulas for Conversions
   A. Using Calculators
   B. Indicators
   C. Computers and Gauges

1V. Post-Assessment
   A. ETS- Test of Applied Literacy Skills
   B. Metrics

New Process Gear: Skilled Trades
Developer: Margaret Hamstead
UAW-CHRYSLER REGION 9 TRAINING CENTER/OCM BOCES
Date: January 6, 1993

METRICS IMMERSION

What do you know already?

1. Estimate the following lengths and volumes.
   a. A paper clip is about _____ cm.

   b. A doorway is about _____ meters.

   c. The width of your fingernail is about _____ mm.

   d. About how many cans of soda does it take to fill a liter bottle? _____

   e. Four small paper clips weigh about _____ grams.

2. Metric prefixes show multiples of 10. Exactly what do the following prefixes indicate?

   kilo = _____ hecto = _____

   centi = _____ deka = _____

   deci = _____ milli = _____

3. Convert the following:

   a. 54 inches = _____ meters

   b. 72 ounces = _____ liters

   c. 6 cm = _____ inches

   d. 3 lbs. = _____ grams

New Process Gear: Skilled Trades
Developer: Margaret Hamstead
UAW-CHRYSLER REGION 9 TRAINING CENTER/OCM BOCES
Date: Post Test March 17, 1993

METRICS IMMERSION

What have you learned since the beginning of this class?

1. Estimate the following lengths and volumes.
   a. A paper clip is about _____ cm.
   b. A doorway is about _____ meters.
   c. The width of your fingernail is about _____ mm.
   d. About how many cans of soda does it take to fill a liter bottle? _____
   e. Four small paper clips weigh about _____ grams.

2. Metric prefixes show multiples of 10. Exactly what do the following prefixes indicate?

   kilo = _____ hecto = _____

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3. Convert the following:
   a. 54 inches = _____ meters
   b. 72 ounces = _____ liters
   c. 6 cm = _____ inches
   d. 3 lbs. = _____ grams

UAW-CHRYSLER
REGION 9 TRAINING CENTER
6075 E. Molloy Road
Syracuse, New York 13211
(315) 463-7185

New Process Gear: Skilled Trades
UAW-CHRYSLER Region 9 Training Center/
OCM BOCES
"Metric Immersion for Skilled Trades"

The course **"Metric Immersion for Skilled Trades"** was a pilot program for New Process Gear workers under the Federal Workplace Skills Improvement Project. Workers attended classes weekly for a total of fifteen sessions at the UAW-CHRYSLER Region 9 Training Center on Wednesday mornings from 7-9 am beginning January 6, 1993 until March 31, 1993. During training, students received hands-on instruction in all areas of metrics. The participants were given a teacher made pre-test on January 6 and the same post-test on March 17. Informal assessment was also utilized throughout the duration of the course in order to monitor individual student progress and plan instruction.

Following are the **results** of the teacher-constructed assessment for this group. The average **pre-test score was 6%** and the **average post-test score was 81%** which shows an **overall average gain of 75%** for this pilot project. In addition, the **lowest pre-test score was 0%** while the **lowest post-test score was 87%. The highest pre-test score was 27%** and the **highest post-test score was 100%. Six** of the ten students **scored 6% or below on the initial test** while **five of the students scored above 93% on the post-test.** Eight of the ten workers completed the course.

All of these statistics seem to indicate that the instruction was more than adequate to meet the needs of the workers and the requirements of the course. The participants showed a remarkable gain in their knowledge of metrics considering that they completed less than thirty hours of actual instruction due to the fact that the pre and post assessments were included within these fifteen weeks. These results also show that these workers have a more thorough understanding of the metric system which in turn allows them to use their conversion charts more accurately. Moreover, they will be able to apply their newly gained experience to their individual trades while continuing to reinforce metrics on a daily basis both at work and in their personal lives.

Our sincere thanks to this pilot group of Skilled Trades workers who gave us their input weekly so that this course could be both successful and fun. Your instructors wish for your continued success and hope that you will consider additional educational ventures in the near future.

Paula Hayes
Margaret Hamstead
Carol Turnbull